NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

APPLYING BUSINESS PROCESS REENGINEERING TO THE MARINE CORPS INFORMATION ASSURANCE CERTIFICATION AND ACCREDITATION PROCESS

by

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September 2009

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REPORT DOCUMENTATION PAGE			*Form Approved OMB No. 0704-0188*

1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** September 2009	**3. REPORT TYPE AND DATES COVERED** Master's Thesis
4. TITLE AND SUBTITLE Applying Business Process Reengineering to the Marine Corps Information Assurance Certification and Accreditation Process		**5. FUNDING NUMBERS**
6. AUTHOR(S) Ryan M. Geer		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000		**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A		**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited	**12b. DISTRIBUTION CODE**

13. ABSTRACT (maximum 200 words)

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This thesis discusses the current "As-Is" state of the IA C&A process model for TSO-KC IT systems and applications, and discusses methods of improving this proces. Potential desired "To-Be" state models are explored using the Knowledge Value Added (KVA) methodology, and the most efficient model is developed and validated by applying it to the current IA C&A process flow at the TSO-KC.

Finally, this thesis recommends aspects of BPR initiatives to apply to the IA C&A process at the TSO-KC to realize positive change. Areas of follow on study to augment the research in this thesis are also briefly discussed.

14. SUBJECT TERMS Business Process Reengineering, Information System, Department of Defense Information Assurance Certification and accreditation Process, Services Organization, BPR, DIACAP, TSO-KC			**15. NUMBER OF PAGES** 123
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UU

NSN 7540-01-280-5500 Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

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APPLYING BUSINESS PROCESS REENGINEERING TO THE MARINE CORPS INFORMATION ASSURANCE CERTIFICATION AND ACCREDITATION PROCESS

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Submitted in partial fulfillment of the
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MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
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LIST OF ACRONYMS AND ABBREVIATIONS

ADP:	Automated Data Processing
ALT:	Actual Learning Time
ASD(NII):	Assistant Secretary of Defense (Networks and Information Integration)
ATD:	Authorization Termination Date
ATO:	Authority To Operate
ATT:	Authority To Test
AWT:	Actual Work Time
BPR:	Business Process Reengineering
C&A:	Certification and Accreditation
CA:	Certifying Authority
CAR:	Certifying Authority Representative
CCB:	Configuration Control Board
CIO:	Chief Information Officer
CL:	Confidentiality Level
CNSS:	Committee on National Security Systems
DAA:	Designated Approving Authority
DADMS:	DON Application and Database Management System
DATO:	Denial of Authority To Operate
DIACAP:	DoD Information Assurance Certification and Accreditation Program
DII:	Defense Information Infrastructure
DIP:	DIACAP Implementation Plan
DISA:	Defense Information Systems Agency
DITPR-DON:	DoD Information Technology Portfolio Repository–Department of the Navy
DITSCAP:	DoD Information Technology Security Certification and Accreditation Process
DoD:	Department of Defense
eMASS:	Enterprise Mission Assurance Support Service (DIACAP tool)

FISMA:	Federal Information Security Management Act
GIG:	Global Information Grid
GS:	General Schedule
HQMC:	Headquarters, United States Marine Corps
IA:	Information Assurance
IAM:	Information Assurance Manager
IAO:	Information Assurance Officer
IATO:	Interim Authority To Operate
IATT:	Interim Authority To Test
IS:	Information System
IT:	Information Technology
KS:	Knowledge Service (DIACAP tool)
KVA:	Knowledge Value Added
MAC:	Mission Assurance Category
MCEN:	Marine Corps Enterprise Network
MCTFS:	Marine Corps Total Force System
MSC:	Major Subordinate Command
NLT:	Nominal Learning Time
P&R:	Programs and Resources Department
PIA:	Privacy Impact Assessment
PM:	Program Manager
POA&M:	Plan of Action & Milestones
ROI:	Return on Investment
ROK:	Return on Knowledge
SCR:	Software Change Request
SDLC:	Software Development Lifecycle
SIP:	System Identification Profile
SORN:	System of Records Notice
SSAA:	System Security Authorization Agreement
ST&E:	Security Test and Evaluation

STIG:	Security Technical Implementation Guide
TAD:	Temporary Additional Duty
T/O:	Table of Organization
TLT:	Total Learning Time
TSO-KC:	Technology Services Organization–Kansas City
TWT:	Total Work Time
UR:	User Representative

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ACKNOWLEDGMENTS

The author would like to acknowledge and express gratitude to United States Marine Corps Captain Jon Disbro and Taiwan Air Force Captain Han-Chiang Chen for their assistance in the initial development of a working model to capture the IA C&A process at the TSO-KC. The author would also like to thank Albert "Buddy" Barreto, Glenn Cook, and Professor Karen Burke for their expertise and guidance.

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I. INTRODUCTION

A. HISTORY AND EVOLUTION OF THE IA C&A PROCESS

1. The Need for Information Assurance Certification and Accreditation in Marine Corps Information Systems

An unsecured computer system connected to the Internet can be compromised in less than ten minutes (C. Buckley, Captain, personal communication, March 23, 2009). With over 350,000 Department of Defense (DoD) computers connected to the Internet through the Navy Marine Corps Intranet (NMCI) ("About NMCI," 2009), a single weakness can translate to devastating effects throughout the entire Global Information Grid (GIG). While each connected node presents a possible avenue of attack and breach point into the GIG, it is impractical to disconnect these nodes. Additionally, it is unrealistic to assume that all associated risk with each connected node can be completely eliminated.

The Committee on National Security Systems (CNSS), chaired by the DoD, sets national policy, establishes operational procedures, promulgates direction, and provides guidance for the security of U.S. Government operated Information Systems (ISs). The CNSS defines Information Assurance (IA) as the:

> Measures that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and nonrepudiation. These measures include providing for restoration of information systems by incorporating protection, detection, and reaction capabilities. (CNSSI, 2006, p. 32)

Additionally, the CNSS defines Certification as a:

> Comprehensive evaluation of the technical and nontechnical security safeguards of an IS to support the accreditation process that establishes the extent to which a particular design and implementation meets a set of specified security requirements. (CNSSI, 2006, p. 8)

The CNSS further defines Accreditation as a:

> Formal declaration by a Designated Accrediting Authority (DAA) that an IS is approved to operate at an acceptable level of risk, based on the implementation of an approved set of technical, managerial, and procedural safeguards. (CNSSI, 2006, p. 2)

IA Certification and Accreditation (C&A), therefore, encapsulates the concept of safeguarding an IS while retaining the ability to operate it. IA C&A is not concerned with risk elimination but rather risk minimization. The need for IA C&A in USMC Information Technology (IT) systems is based on the need to protect the GIG and maintain mission readiness through the identification, measurement, control, and mitigation of security risks. IA C&A, however, is not limited to networks or external threats. The C&A process is necessary for all IT sites and systems, regardless of node connectivity, to internal, external, manmade, and natural threats to ensure the protection of data on these systems.

When Automated Data Processing (ADP) equipment first came into use in the DoD, the unique security risks of such systems were not fully understood, appreciated, or mitigated. Rather, the DoD viewed computers and computer-related systems simply as tools for accomplishing tasks in a more proficient manner. As these systems became more prevalent, however, it was clear that these systems were susceptible to their own inherent weaknesses and flaws.

As the DoD's dependence on these systems grew, so did a need to develop an Information Security Policy in the DoD. On 15 August 1983, the National Computer Security Center (NCSC) issued the first Common Security Criteria Standard. Called CSC-STD-001-83, this document provided a set of basic security requirements and evaluation controls for developing and assessing trustworthy commercial software and hardware products for use in DoD and Government ADP systems. The criteria defined in this publication were the basis for the DoD 5200.28-STD, released on 26 December 1985. Entitled the "Department of Defense Trusted Computer System Evaluation Criteria," and more commonly referred to as the "Orange Book" for its orange cover, this document was the first of a series of guidelines published by the NCSC to address

specific aspects of security criteria and associated evaluation methodologies, policies, and responsibilities promulgated by DoD Directive 5200.28. Collectively, these documents, all with different colored covers, were known as the "Rainbow Series" and are the foundation for Information Assurance in the DoD today.

2. DoD Information Technology Security Certification and Accreditation Process

The DoD Information Technology Security Certification and Accreditation Process (DITSCAP) was promulgated in DoDI 5200.40. The DITSCAP, introduced on 30 December 1997, required all DoD Information Systems to achieve Certification and Accreditation prior to operation. DoDI 5200.40 was a life-cycle approach to security accreditation and presented the first standardized information assurance process for all DoD systems. The DITSCAP established a standard DOD-wide process, set of activities, general tasks, and a management structure to certify and accredit an Information System (IS) that will maintain the IA and security posture of the Defense Information Infrastructure (DII) throughout the life cycle of the system (K. Burke, personal communication, 22 April 2009). The DITSCAP is an important document because it established a foundation for the C&A process today. The DITSCAP had four distinct phases. Figure 1 details these phases.

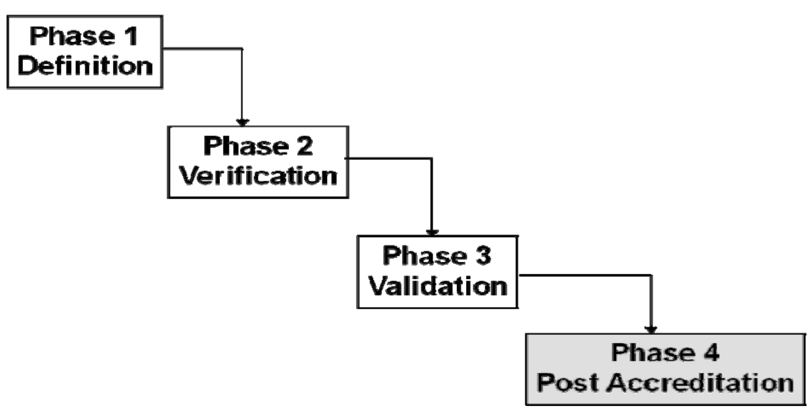

Figure 1. The Four DITSCAP Phases (After DoDI 5200.40, p. 17)

The deliverable for the first DITSCAP phase is the System Security Authorization Agreement (SSAA). The SSAA documents the system mission, security requirements, classification, architecture, accreditation boundary, schedule, and resources. It also defines the C&A level of effort, identifies C&A roles and responsibilities and describes the methods implementing security requirements for the system. Figure 2 details the first DITSCAP phase.

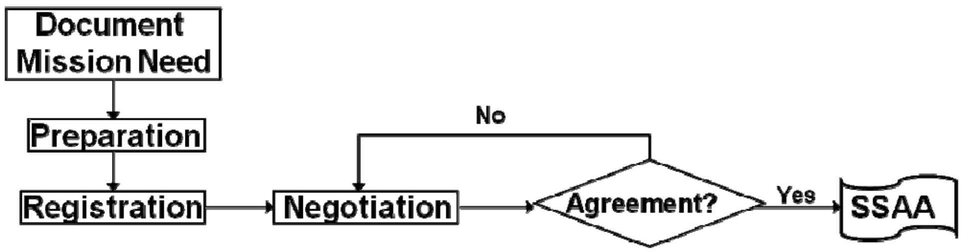

Figure 2. DITSCAP Phase One (After DoDI 5200.40, p. 19)

The second DITSCAP phase verifies the system's compliance against the requirements in the SSAA. The objective of phase two is the detailed analysis of system architecture, software design, and life cycle management to ensure the system is fully integrated for certification testing and accreditation. Phase two also verifies network connection rule compliance, security requirements validation, and vulnerability evaluation. Figure 3 details the second DITSCAP phase.

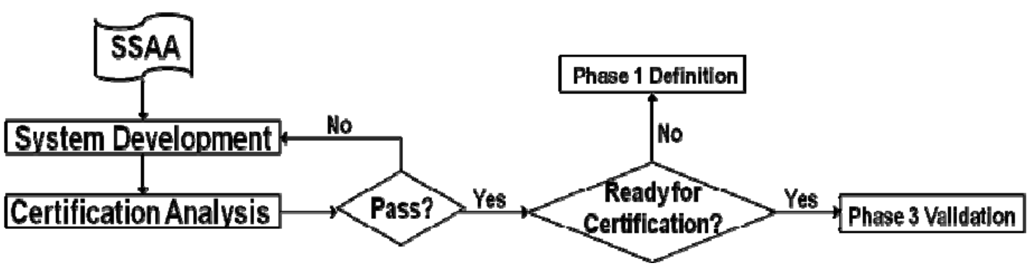

Figure 3. DITSCAP Phase Two (After DoDI 5200.40, p. 27)

Phase three of the DITSCAP seeks to obtain system accreditation and authorization to operate. Security Test and Evaluation (ST&E) procedures are performed to evaluate system conformance with security requirements, mission, and architecture as

defined in the SSAA. A certification report is issued, and the phase ends with an accreditation decision from the Designated Approving Authority (DAA). Figure 4 details the third DITSCAP phase.

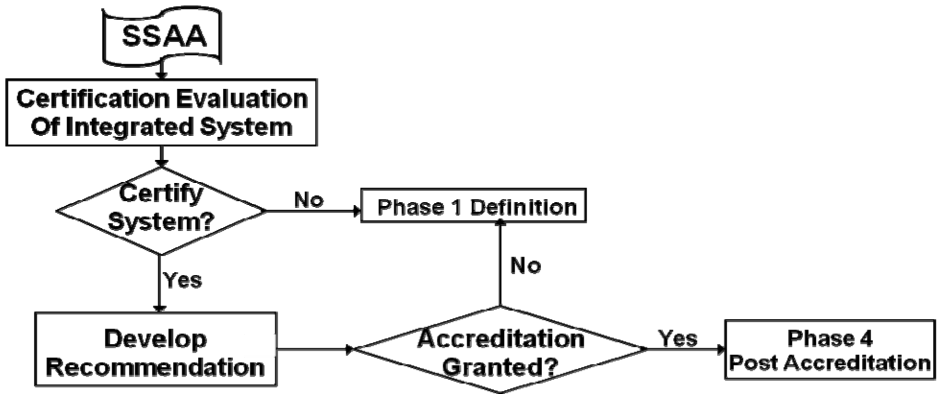

Figure 4. DITSCAP Phase Three (After DoDI 5200.40, p. 32)

The fourth DITSCAP phase starts after the system is given accreditation. During this phase, DITSCAP responsibilities shift to the organization(s) operating the system. The objective of this final phase is to preserve a strong C&A posture by maintaining an acceptable level of residual risk throughout its life cycle, eventually ending with system termination. Figure 5 details the fourth DITSCAP phase

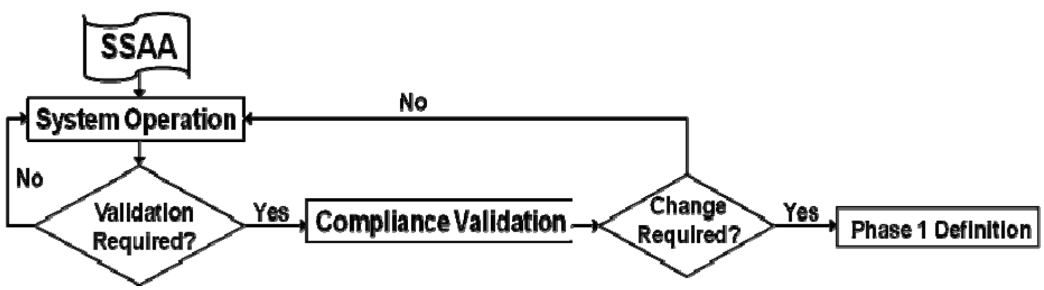

Figure 5. DITSCAP Phase Four (After DoDI 5200.40, p. 38)

Although DITSCAP brought responsible organizations together and defined a continuous C&A process throughout the system life cycle, it was still based on stove-piped, stand alone architectures. It lacked the wholly net-centric approach to IA C&A that is required of the interconnected GIG. On 6 July 2006 the Assistant Secretary of

Defense (Networks and Information Integration)/DoD Chief Information Officer (ASD(NII)/DoD CIO) released the interim DoD C&A process guidance. Signed on 28 November 2007, DoDI 8510.01—the DoD Information Assurance Certification and Accreditation Process (DIACAP) officially retired the DITSCAP.

B. PURPOSE

This thesis examines the IA C&A process as it pertains to pay, personnel accounting and financial systems and applications developed by the Technology Services Organization—Kansas City (TSO-KC), Programs & Resources Department (P&R), Headquarters, United States Marine Corps (HQMC) located in Kansas City, Missouri.

Prior to operation of standalone systems or connection with the DoD Global Information Grid (GIG), all TSO-KC created IT systems must be certified and accredited and receive an Interim Authority to Test (IATT), Authority To Test (ATT), Interim Authority to Operate (IATO), or Authority To Operate (ATO) by the Marine Corps' DAA using the DIACAP process. Rather than examining the system or application at the end of its development cycle and pursuing certification, the TSO-KC IA team performs the C&A process in parallel with development.

There are three scenarios in which the DIACAP will be initiated: 1) The C&A process is employed with the creation of a new system, or if there is a major modification to an existing system; 2) All systems undergo an annual review, which ensures that the current accreditation is still relevant and up to date; and 3) Systems require ATO renewal every three years. This renewal entails an entire system review and all IA controls are examined to ensure compliance.

C. SCOPE

As with all IS platforms in the DoD, the importance of C&A in pay, personnel accounting, and financial systems has risen dramatically in recent years. With the migration of these systems to Information Technology (IT) automated platforms, ensuring and enforcing information security has become a major issue. The overall focus of the TSO-KC has historically been quality assurance, with less effort placed on timely

completion and cost minimization. With this in mind, this thesis will capture and document the IA C&A process and analyze it from the perspective of Knowledge Value Added (KVA) to the process.

The KVA methodology standardizes and measures the knowledge used in an organization's business process. Through the analysis of KVA, process owners can measure the Return on Knowledge (ROK) and Return on Investment (ROI) of specific sub-processes within a particular business process. This thesis captures those measurements for the current "As-Is" process model. Using the "As-Is" model as a baseline, techniques of Business Process Reengineering (BPR) are applied to the model to generate a desired "To-Be" process model with the purpose of reducing both overall process time and cost, while maintaining or increasing the quality of the process output. Two desired models are created, each attempting to achieve a radical change to the flow for the DIACAP at the TSO-KC. While maintaining the TSO-KC's focus for high quality of output, the desired models shorten timelines of the overall DIACAP and in turn reduce the total costs associated with each DIACAP package.

1. Technical Services Organization, Kansas City (TSO-KC)

The TSO-KC is a unique organization in the Marine Corps. The decision to create or modify a system originates outside of the TSO-KC. System changes are submitted to the TSO-KC in the form of Software Change Requests (SCRs) from the customer, known as the functional or requirements manager. (The functional manager later becomes the Program Manager (PM); each IS typically has a uniquely assigned PM.) The request is submitted through a Configuration Control Board (CCB), one of the steps in the Software Development Life Cycle (SDLC). The CCB is typically co-chaired by both the TSO-KC (as the systems technical manager) and the functional manager(s). During the CCB, the functional manger provides the requirements and outlines the guidelines and standards for the proposed system. The TSO-KC responds with project feasibility and estimated cost. If the functional manager and TSO-KC agree on the proposed system's

requirements and price, the corresponding TSO-KC division will begin system design. At this point, the functional manager becomes the PM for the system. Generally there is no IA representative present during any pre-CCB or CCB processes.

After a TSO-KC division receives approval to begin system development, its respective division head assigns an Information Assurance Officer (IAO). The IAO can be anyone in the division; the duty is assigned as a collateral billet. Currently, no formal training is required for an assigned IAO. Depending on the system architecture (mainframe, web-based, tiered, etc.), the IAO is responsible for submitting several documents to the TSO-KC Information Assurance Manager (IAM) for verification and subsequent forwarding outside the TSO-KC. Collectively, these documents are known as the DIACAP Package (formerly known as the SSAA under DITSCAP) and contain the System Identification Profile (SIP), the DIACAP Implementation Plan (DIP), the IA Controls Plan of Action & Milestones (POA&M), and Supporting Information. Although a particular architecture has varying requirements, the following are examples of the multitude of supporting information for any C&A effort:

- System of Records Notice (SORN)
- Privacy Impact Assessment (PIA)
- Contingency Plan
- Contingency Plan Test Date
- IA Controls Validation
- Re-Evaluation of IA Controls after POA&M
- DIACAP Scorecard
- Accreditation Determination
- C&A Package Complete
- Project Manager Review
- Security Controls Tested
- Annual Security Review
- Authority To Operate (ATO; this is the result (approval) of the C&A effort)

D. METHODOLOGY

This thesis begins as a case study for the TSO-KC to examine the C&A process as it pertains to TSO-KC generated Information Sites and Systems. Although consistently evolving, the goal of this thesis is to deliver to the TSO-KC a feasible, practical solution to the bottlenecks in their current DIACAP package process flows, thereby decreasing cost and time required while maintaining the same level of quality in their produced Information Sites and Systems.

1. Review Available References and Conduct Personal Interviews

To better understand the DIACAP both as an overall process and specific to the TSO-KC, several criteria, standards, directives, instructions, and orders are consulted. Additionally, personal interviews are conducted with key participant in the C&A process, both at the TSO-KC as well as Headquarters Marine Corps (HQMC) Command, Control, Communications, and Computers (C4), in Washington, D.C.

2. Identify Tools and Model used in the IA C&A Process

Successful execution of the IA C&A Process is enabled through three inter-related DoD initiatives: Process, Automation, and Accessible Guidance. The DIACAP incorporates two important services, or tools, that allow the policy to remain applicable to net-centric C&A: 1) The DIACAP Knowledge Service (KS) and 2) the Enterprise Mission Assurance Support Service (eMASS). The DIACAP KS provides an online forum, including other users' expertise, instructions, and templates, to assist in executing the DIACAP. The eMASS automates capabilities that enable the DIACAP, helping to transition it to a truly electronic medium. Additionally, the Marine Corps procured a Commercial-Off-The-Shelf (COTS) product called Xacta to automate the submission and status tracking of C&A efforts. TSO-KC was one of the first organizations targeted for Xacta implementation, but it is not currently employed at the TSO-KC.

3. Select Candidate Tools to Achieve a Desired Process Model

In order to capture the process flow of the DIACAP at the TSO-KC, the Savvion Process Modeler software packages is applied to achieve a desired process model of the current "As-Is" model, and to develop two desired "To-Be" models of the DIACAP at the TSO-KC. These process models are then instantiated to analyze the benefits and detriments of the BPR initiatives in order to determine the most advantageous process model for the TSO-KC IA C&A process.

4. Recommend for Further Testing and Potential Implementation any Process Model Suitable for Use by the TSO-KC

Based on the research gathered and output from the Savvion Process Modeler, the TSO-KC has several options to reengineer their IA C&A Process. While these recommendations will be explained in detail during the conclusion of this thesis, the following bullet points present a brief overview of options available to the TSO-KC:

- The TSO-KC act as its own Echelon II Major Subordinate Command (MSC) throughout the entire C&A life cycle.
- PMs and User Representatives (URs) be granted Temporary Additional Duty (TAD) to TSO-KC from their permanent duty stations during the first three DIACAP activities. Additionally, the TSO-KC should maintain Operational Control (OPCON) over these key personnel during the system's C&A annual review and reaccreditation.
- The TSO-KC organically employ a Certifying Authority Representative (CAR), a Validator, and four (4) dedicated IAOs.

II. BACKGROUND

A. CURRENT ENVIRONMENT

1. Department of Defense Information Assurance Certification and Accreditation Process

The Department of Defense Information Assurance Certification and Accreditation Process (DIACAP) is a net-centric, enterprise approach to Certification and Accreditation (C&A) in the DoD. It incorporates a continuous review and monitoring process using automated tools, allowing it to be a dynamic policy based on standardized Information Assurance (IA) Controls. The dynamic approach incorporated in the DIACAP ensures compliance with federal regulations more so than the static approach of the DITSCAP because it offers more flexibility and improved response time to changes in IA posture.

The purpose of developing a DIACAP package is to ensure that IA Controls are identified, implemented, and validated for all DoD Information Sites and Systems in order to determine whether or not these sites or systems are in compliance with the Global Information Grid (GIG) and should be granted an Authorization to Operate (ATO). The overall goal of the DIACAP is to manage the residual risk of threats and vulnerabilities in order to balance the benefits Information Technology (IT) environments provide with the risks their use presents.

The DIACAP differs from the DITSCAP on many levels. The most notable of these is the paradigm that no Information System (IS), regardless of mission, platform, or software architecture, is a truly stand alone system. IA C&A is no longer effective from the perspective of individual information systems. The DIACAP transforms the DITSCAP's "stove pipe" C&A approach and presents a net-centric, enterprise approach to C&A. Furthermore, the DIACAP recognizes that DoD Information Sites and Systems are fluid, living systems and that IA C&A solutions must be as equally dynamic in nature

as the systems they accredit. Several other aspects of these C&A methodologies separate the DIACAP from the DITSCAP. Table 1 outlines these major differences between the DITSCAP and the DIACAP.

DITSCAP	DIACAP
Platform/system centric	Net-centric, Enterprise approach
Three year "snapshots" of security posture	Continuous review and monitoring
Paper based	Automated tools based
Localized, static security requirements	Dynamic policy based on standardized IA controls
Security Requirements are unique to each system	All systems inherit enterprise-wide standards and requirements
System operation must be reauthorized not less than every three years	IA controls must be continuously monitored and reviewed not less than annually
Policy advocates tailoring, but process is hard-coded to phases	Steps are flexible, modular, and continuous. Each system works to a DIACAP POA&M that aligns to the SDLC
Inaccurate association of ATO with perfect and unchanging security needs	ATO means operational risk is at an acceptable level to support the mission

Table 1. DITSCAP vs. DIACAP

The DIACAP is not necessarily more complicated than the DITSCAP, but does require a more vigilant and organized attitude toward C&A. Key personnel have very specific roles and responsibilities throughout the DIACAP. As such, DIACAP procedures are better defined, more precise, and farther detailed than procedures outlined by the DITSCAP. Tacit knowledge of well trained, highly educated personnel, gained through practical experience in the C&A field, adds considerable value to the process.

Additionally, the relationships between various personnel generated by the DIACAP can have a synergistically positive or negative effect on every DIACAP package that seeks accreditation.

The DIACAP consists of five separate but intertwined activities. Figure 6 shows the DIACAP activities and the cyclic relationship between them.

Figure 6. The DIACAP Activities (After Buckley, 2009)

Similar to, but more encompassing than the DITSCAP, the DIACAP is a cycle of four activities that continuously evaluate the level of risk inherent in a system and establish the best means to reduce that risk. Additionally, the DIACAP contains a fifth activity to remove a system from the cycle should it become inactive. The activities that make up the DIACAP are 1) Initiate and Plan, 2) Implement and Validate IA Controls, 3) Make C&A determination and decisions, 4) Maintain accreditation and conduct reviews, and 5) Decommission the system. These five activities are detailed as follows:

Activity One: Initiate and Plan IA C&A. First, the system that needs C&A must be properly identified and registered with the governing DoD Component IA program. DIACAP team roles and responsibilities must be assigned, and the Mission Assurance Category (MAC) and Confidentiality Level (CL) need to be determined. IA controls are identified and assigned based on that MAC and CL determination. The DIACAP Implementation Plan (DIP) is developed and initiated to determine how each IA control will be met (whether or not inherited, or identifying implementation tasks, responsible entities, estimated completion dates, and supporting materials and references). This activity is the most important in the DIACAP because subsequent activities are based on the C&A plan developed here. If the above is not accurate, the remainder of the activities will be flawed. Figure 7 details the first DIACAP activity.

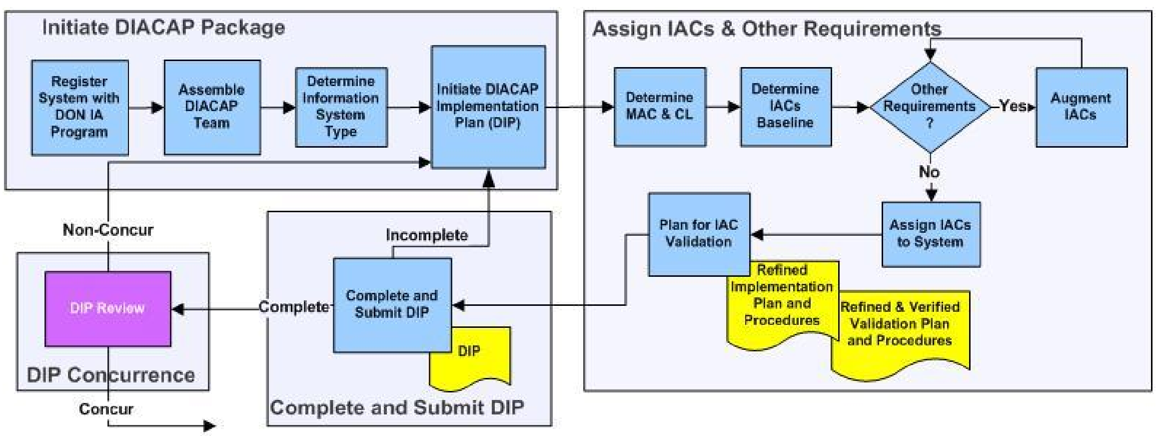

Figure 7. DIACAP Activity One (From Buckley, 2009)

Activity Two: Implement and Validate Assigned IA Controls. The DIP is executed; IA controls are implemented then validated using validation procedures that indentify any preparatory and actual steps, the expected results, and criteria for recording the actual results. After the IA controls are validated, actual results are compared to the expected results. IA controls that are compliant are recorded in the DIACAP Scorecard. For any noncompliant controls, a Plan of Action and Milestone (POA&M) document is generated to reassess, re-implement, and revalidate those controls. After an IA control is

revalidated and found to be in compliance it will be updated to (but not removed from) the POA&M. Activity two completes the C&A package and establishes concurrence from the owning command. Figure 8 details the second DIACAP activity.

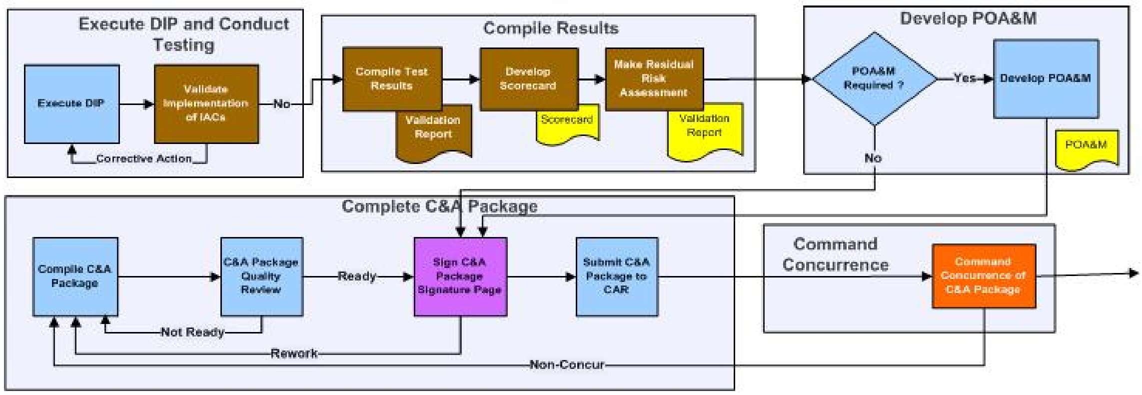

Figure 8. DIACAP Activity Two (From Buckley, 2009)

Activity Three: Make Certification Determination and Accreditation Decision. In this activity, the CA reviews the DIACAP package and makes a certification decision based on the contents of the package and the results of the IA controls validation. After certification, the DAA issues an accreditation decision based on the mission need, the protection of data, the information environment, and the level of acceptable risk inherent in the site or system. For units falling under a Major Subordinate Command (MSC) to include the TSO-KC, a Certifying Authority Representative (CAR) makes a certification determination on whether the system is sufficiently secure, and passes that recommendation to the Marine Corps Enterprise Network (MCEN) CA. Test results, IA control compliance, and residual risk (the risk remaining after mitigation) are evaluated. The MCEN DAA then accepts or does not accept the level of residual risk in the system, and issues the accreditation decision.

In the DIACAP, there are four accreditation decisions. (DoDI 8510.01, 2007, p. 19) Each accreditation is also given an Authorization Termination Date (ATD) which stipulates the lifespan of that particular accreditation decision. The four accreditation decisions are outlined as follows:

- Authorization to Operate (ATO). An ATO decision is valid for three years from the authorization date, but must be reviewed when a major change to the environment or a major modification is made to the system, and at least annually.
- Interim Authorization to Operate (IATO). Based on the ATD, an IATO decision is valid for up to, but not more than 180 days. The DAA cannot grant more than two consecutive IATOs for a system (360 days maximum).
- Interim Authorization to Test (IATT). An IATT decision may be granted in special cases when the system needs authorization to run “live” data or in a “live” environment that would be otherwise impractical to achieve. An IATT may not be used to avoid validation requirements for an ATO or IATO. An IATT is granted with an ATD related specifically to the duration of the operational test.
- Denial of Authorization to Operate (DATO). A DATO decision is issued if the DAA deems the corresponding system’s IA design to be inadequate. If a system is already running without accreditation, a DATO is issued to immediately suspend that system, as DATOs imply an instant ATD.

The most common accreditation decisions received are ATO or IATO. A DATO is rare, as the trust relationships built among the C&A community allow for alternative avenues to correct discrepancies and mitigate risk, to an acceptable level prior to reaching an accreditation decision. The price for these avenues is often time, resulting in project delay. Additionally, incomplete packages are delayed at the CA/DAA level, resulting in accreditation delay and significantly contributing to overall project delay. Because the third DIACAP activity is performed at the CA and DAA level, the TSO-KC currently has no control over its timeliness or even completion. Several personnel interviewed at the TSO-KC referred to this activity as the “black hole.” Figure 9 details the third DIACAP activity.

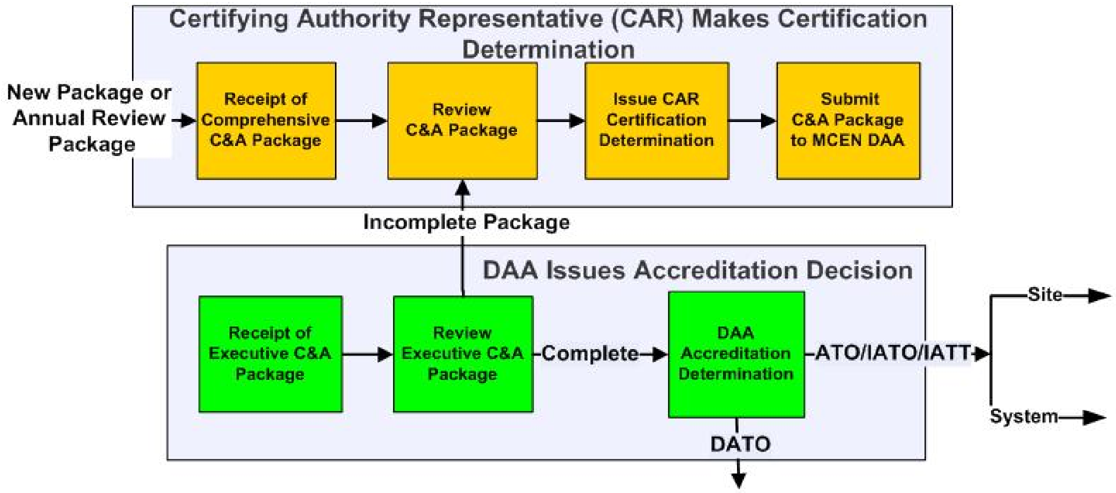

Figure 9. DIACAP Activity Three (From Buckley, 2009)

Activity Four: Maintain Authorization to Operate and Conduct Reviews. In the fourth activity, the system is installed. The site or system is monitored for any security related events or changes that may impact its IA posture and require a change in the accreditation determination. ATOs are reviewed at least annually and IATOs are monitored for upgrade to ATO when IA controls are met and unnecessary risk is mitigated (or downgraded to DATO should those risks remain). Situational awareness is maintained throughout the lifecycle of the system and reaccreditation of ATO operational systems occur every three years. This activity comprises long-term efforts of the system owner; it recalls the first three DIACAP activities as required for reaccreditation and remains in effect for the life of the site or system. Figure 10 details the fourth DIACAP activity.

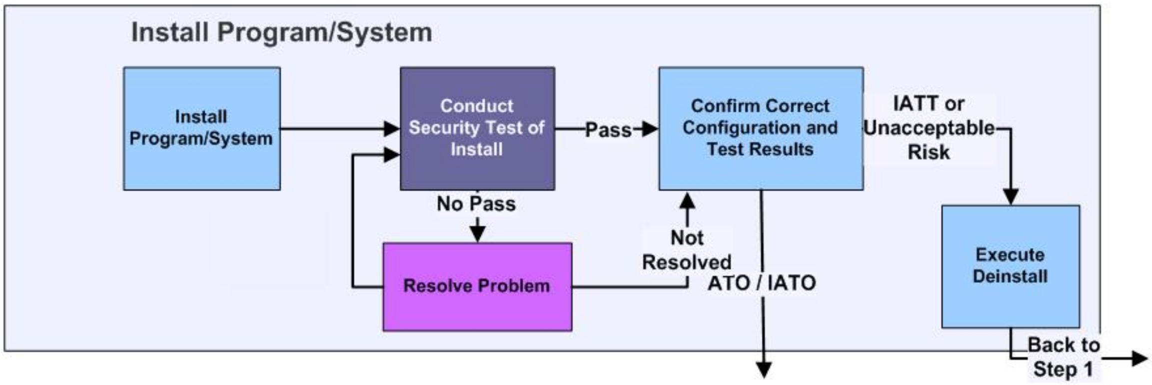

Figure 10. DIACAP Activity Four (From Buckley, 2009)

Activity Five: Decommission. The final activity in the DIACAP provides for a structured, controlled, and complete means of retiring a system. The stakeholders and system users are notified of the system decommission. Risk to the remaining environment is evaluated. Any affected inheritance relationships are assessed for impact, and the system is removed. The system's DIACAP scorecard, POA&M, and any artifacts or supporting documentation are removed and disposed of according to their respective classification. Figure 11 details the fifth DIACAP activity.

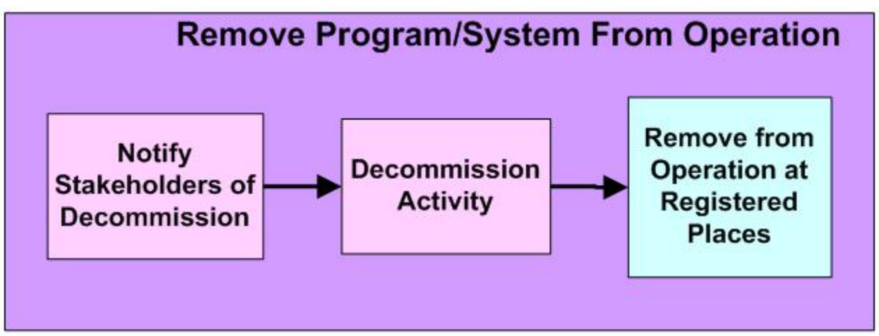

Figure 11. DIACAP Activity Five (From Buckley, 2009)

Figure 12 further explains the cyclic nature of the DIACAP, each of its activities, and the tasks associated with each activity.

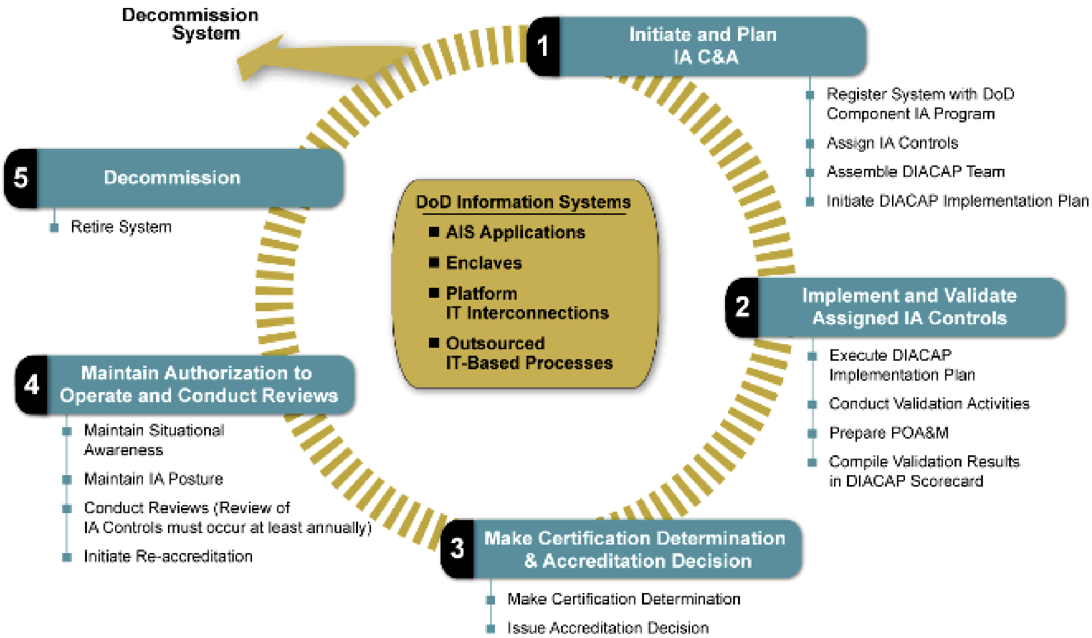

Figure 12. Tasks Associated with Each of the DIACAP Activities (From "DIACAP Activities," 2009)

2. DoD, DON, and USMC Process Restrictions

DoDI 8500.2 establishes an IA level baseline by assigning specific IA controls to all DoD ISs depending on the respective MAC of the system and CL of the data stored, processed, and protected by that system. These IA controls support the Federal Information Security Management Act (FISMA) of 2002 and are mandatory for all DoD organizations. All C&A efforts seek to correctly identify and implement the IA controls for a particular system; the DoD C&A process must comply with these controls. Requirements are nontechnical and technical in nature. Nontechnical requirements include physical protection and administrative rules that support and enforce IA security policy. Technical requirements specify the automated functions and processes of a particular IT system required to enforce IA policy. These requirements are verified

during DIACAP activities two and three. Technical requirements are obtained from regulations, directives, and instructions and derived further by the mission of the system and IA policy.

The best way to determine IA requirements for a system is to consult the DIACAP Knowledge Service (KS). DoDI 8510.01 instructs the Director of the National Security Agency to “Develop the IA component of the GIG architecture and publish supporting implementation material in the DIACAP KS” (DoDI 8510.01, p. 5). More conclusively, though, subparagraph 6.1 states, “DIACAP implementation is supported by the DIACAP KS, a Web-based DoD resource that provides the most current requirements, guidance, and tools for implementing and executing the DIACAP, including IA control implementation procedures” (DoDI 8510.01, p. 9). It’s these IA controls that detail what the DIACAP team must do to/for an IS prior to connecting it to the GIG. The DIACAP KS provides IA personnel with a single authorized source of up-to-date guidance for implementing the DIACAP.

Risks and vulnerabilities in IT systems can only be mitigated and never completely eliminated. Since the goal is to reduce risk as much as possible to an acceptable level, much of C&A is subjective in nature. Guidelines are interpreted differently by different people with different objectives. The key to successful C&A is the buildup of strong relationships and good rapport through communication and trust. Personnel must establish trust in order to achieve a successful accreditation decision. Restrictions are enforced at every level to facilitate the building of these relationships. Table 2 outlines the billet restrictions in the DIACAP.

These relationships and their associated restrictions play a pivotal role in successfully completing a DIACAP package. The desired “To-Be” process models discussed in Chapter Three incorporate these relationships into the Business Process Reengineering initiative. Table 2 does not list all the actor roles involved in the DIACAP. But because the restrictions outlined in Table 2 are the only relationship limitations imposed on the DIACAP by Department of Defense Instruction 8510.01, relationships involving other roles remain unclear. Other actors involved in the C&A process but whose relationship restrictions are not listed in the below table, such as the CAR, can be

implemented at the TSO-KC level as long as their service reflects the spirit of the order. Captain Charles Buckley, the Enterprise Information Assurance Officer at Headquarters Marine Corps (HQMC) Command, Control, Communications, and Computers (C4), in Washington, D.C., states that, “Any unit with a CAR assigned can perform these [DIACAP] functions” (C. Buckley, Captain, personal communication, 1 June 2009). As stated earlier in this chapter, a CAR acts on behalf of the CA and has the authority to make a recommendation for accreditation to the MCEN DAA.

Relationships	**Allowed (Y/N)**
PAA may be a DAA	Yes
DAA reports to the PM, SM, or Program Executive Officer (PEO)	No
DAA and CA for a DoD IS may be the same person	Yes
CIO may be a DAA	Yes
CA reports to a DAA	Yes
CA reports to the PM , SM, or PEO	No
PM or SM and CA both report to the DAA	Yes
PM or SM and CA for a DoD IS may be the same person	No
PM or SM and DAA for a DoD IS may be the same person	No
PM or SM and UR for a DoD IS may be the same person	No
PM or SM reports to CA	No
PM or SM reports to the CIO	Yes
PM or SM reports to the DAA	Yes
UR reports to the CIO	Yes
UR reports to the PM or SM	No
UR reports to the SIAO/CA	Yes

Table 2. Allowable relationships among DIACAP personnel (From DoDI 8510.01, p. 15)

The overall goal of the DIACAP is to achieve system or site accreditation and allow its operation while mitigating residual risk to as low a level as possible. All nontechnical and technical requirements for IA controls must be addressed, and nothing in the process can be assumed away.

3. Xacta Software Tool

On 23 November 2008, Brigadier General Allen (Director of C4 and CIO of the Marine Corps) authorized Marine Corps Bulletin 5239 mandating that all USMC IT assets transition to the DIACAP (MarAdmin 663/08). To aid in the achievement of automating the C&A process, the USMC implemented a COTS software solution called the Xacta IA Manager, created by the Telos Corporation. MCBUL 5239 stated that all NIPRNET C&A packages not yet under review (at the CA/DAA level) must use the Xacta IA Manager to create and submit C&A documentation.

The Xacta IA Manager software automates the C&A submission process by selecting, validating, and enforcing the IA controls required for a system based on MAC and CL, as defined by DoDI 8500.2. In addition, it creates and maintains C&A documentation required in the DIACAP. Xacta IA Manager streamlines the entire DIACAP by automatically selecting IA controls appropriate for a particular system, presenting the validation processes associated with those IA controls, and evaluating those controls per the guidelines in the DIACAP. Xacta IA Manager then assists in creating the DIACAP accreditation documentation, including the SIP, DIP, DIACAP Scorecard, POA&M, and other C&A documentation required for that particular system's accreditation.

More than the establishment and documentation of a DIACAP package, the Xacta IA Manager enables the integration of cross-department functions that impact security, continuous updating of IA postures through threat and vulnerability assessments, and automatic dynamic remediation of IA procedures. The key benefits of the Xacta IA Manager are asset awareness and hardware/software inventory, security configuration scanning, security requirements evaluation, DIACAP documentation, continuous risk and compliance reporting (for activity four of the DIACAP), continuous IA posture

assessment, process automation, vulnerability assessment, management, trend analysis, and remediation, and software patch and upgrade automation. These features would allow the TSO-KC to integrate its C&A efforts by incorporating personnel, systems, and data to create a seamless, synchronized, and automated C&A environment. Figure 13 shows a screenshot of the Xacta IA Manager's IA control compliance report.

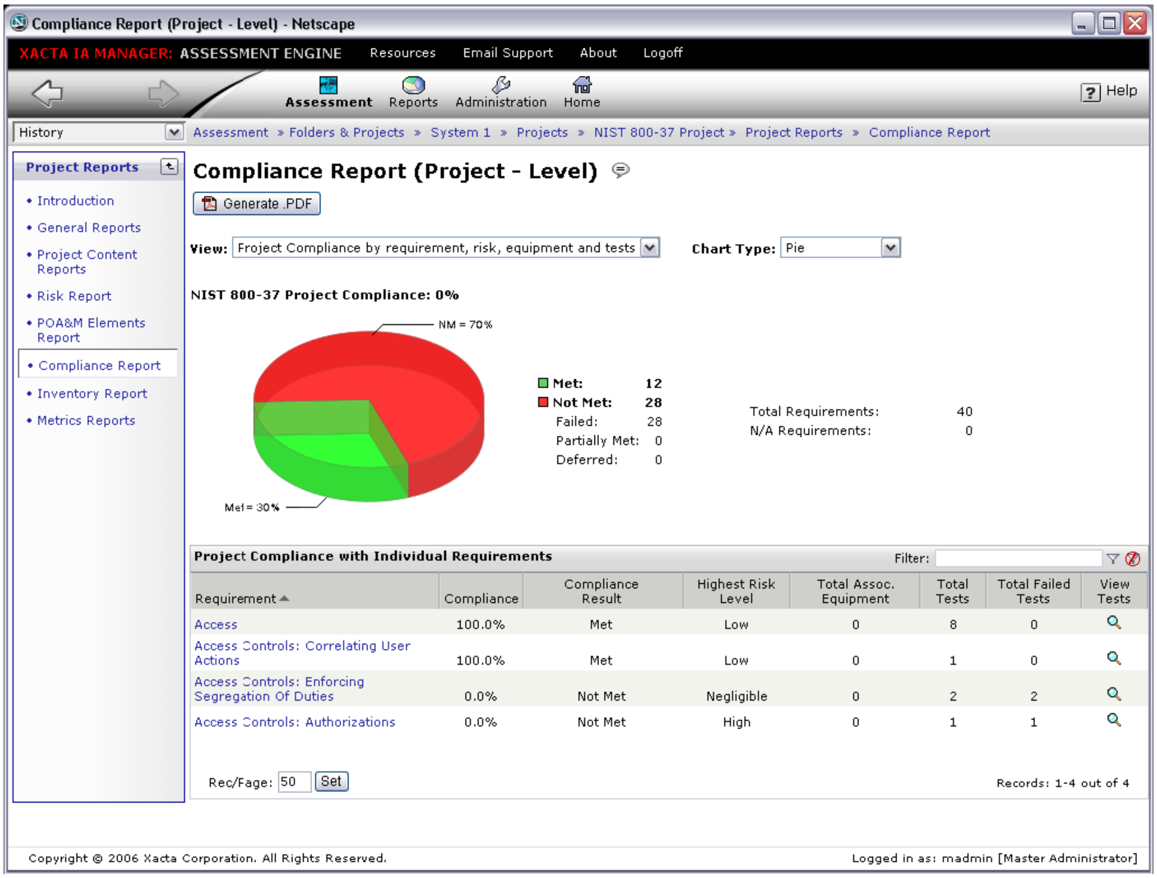

Figure 13. Xacta IA Manager's IA Control Compliance Report (From "Compliance Assessment," 2009)

B. CURRENT STATE EVALUATION

Although there is currently no defined C&A process timeline, recent efforts at the TSO-KC have taken up to one year to complete. The actual IT system is developed in parallel with the C&A documentation. The IAO typically sends required documents to the IAM via email or physical "hard" copy. The IA team uses an Excel spreadsheet to

track the IAO's progress. Once all documents are complete, packages are sent to the Project Manager (PM; an external actor working within the TSO-KC). The PM owns the system. After reviewed by the PM, the C&A documentation is sent to the Certifying Authority (CA). The CA also reviews and validates the C&A documents for the system, and then sends it to the Designated Approving Authority (DAA). The DAA is the sole authority to grant final approval for the system to be placed into production or "go live" for Marine Corps' use. Although the C&A documentation leaves the control of the TSO-KC IAM when it's passed to the PM, the process does not end. Typically, the C&A credentials can be delayed or outright rejected by the PM, CA, or DAA. In addition, the TSO-KC IA team usually emails the C&A documents to the PM. The PM and CA often assign the task to review the C&A package to contracted support whose knowledge and understanding of these systems and applications is usually very limited. Often, pieces of the C&A documents are misplaced, and need to be resent.

One of the most difficult aspects of the C&A process at the TSO-KC is that each system involves various actors, each with varying levels of expertise regarding the overall C&A process. Per system, the actors involved in this process are as follows:

- Functional Manager: GS12 or Contractor Equivalent (External)
- TSO-KC Deputy Director: Major (Internal)
- TSO Division Head: Captain, Major or GS14 (Internal)
- TSO Branch Head: GS13 (Internal)
- Information Assurance Manager (IAM): GS12 (Internal)
- Information Assurance Personnel: 3 X GS9–GS12, Contractor (Internal)
- Information Assurance Officer (IAO): Sgt thru CWO, Contractor, GS11–13 (Internal)
- Program Manager (PM): CWO-4, contractor, or GS-12 (External)
- Certifying Authority (CA): Contractor, GS12/higher (External)
- Designated Approving Authority (DAA) GS15 (External)

1. Principle C&A Process Benefits

The personnel at the TSO-KC are competent and knowledgeable. All players in the DIACAP team work well together and have a strong commitment to the organization and their duties. The TSO-KC transitioned from the DITSCAP to the DIACAP in January 2007. The Marine Corps Total Force System (MCTFS), an integrated pay and personnel system, was the first IS to transition to the DIACAP for the USMC. Every TSO-KC generated system has a current ATO. The tacit knowledge, experience, and working relationships of the IA staff are invaluable and represent the principle benefits of the C&A process at the TSO-KC.

2. Principle C&A Process Shortfalls

Although the personnel at the TSO-KC work diligently and continue to make mission, the organization is still processing DIACAP packages manually. Rather than automate the process flow through the use of the Xacta IA Manager, versions are tracked manually and documentation revisions emailed both internally and externally, creating inaccurate situational awareness and workload redundancy. When documentation is revised, the latest versions may or may not be merged into the final package.

Additionally, although the organic C&A process occurs analogously with system development, the DIACAP flow is not truly followed, and its full benefits are not fully realized. URs have very little input into the DIACAP, and do not appear to give an in-depth review after the DIACAP package is complete. PMs, more concerned with the functionality of the system, are not involved in the DIACAP at an acceptable level of commitment.

The manual implementation of an automated process and the bottlenecks which occur at the coupling of the TSO-KC to the PM, CA, and DAA result in time delays and increased cost. These are the principle C&A process shortfalls at the TSO-KC.

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III. PROCESS MODEL DESCRIPTION AND BUSINESS PROCESS REENGINEERING GOALS

A. INTRODUCTION OF PROCESS MODELS

To better understand the current environment in which the Technical Services Organization, Kansas City (TSO-KC) Certification and Accreditation (C&A) effort operates, a current baseline “As-Is” process model was designed using the Savvion Process Modeler Software. The current process model was created based on three separate criteria: 1) Research conducted to gain an accurate understanding of the DoD Information Technology Security Certification and Accreditation Process (DITSCAP) and DoD Information Assurance Certification and Accreditation Process (DIACAP) and the fundamental differences between the two processes; 2) Personal interviews with key actors in the TSO-KC C&A process, to include the Information Assurance Manager (IAM) and several Information Assurance Officers (IAOs); and 3) Personal interviews with key actors at Headquarters Marine Corps (HQMC) Command, Control, Communications, and Computers (C4), in Washington, D.C., to include the Enterprise Information Assurance Officer and Information Assurance Analysts.

In addition, two desired “To-Be” process models are developed incorporating different levels of BPR initiatives. The desired process models, while based on the same criteria as the current model, also included distinct features not present in the current model. These models are run and analyzed to determine their affects on the current environment.

1. Process Methodology

Both the current and desired process models capture only the first three activities of the DIACAP at the TSO-KC. As discussed in Chapter II, the first three activities are 1) Initiate and Plan IA C&A; 2) Implement and Validate Assigned IA Controls; and 3) Certification Determination and Accreditation. The first three activities only are captured in the process models because these activities encapsulate all action required by the TSO-

KC to achieve and maintain an accreditation decision for their Information Systems (ISs). The fourth activity, Maintaining Authorization to Operate and Conduct Reviews, initiates action on the first three activities and is therefore not captured in the process models. Additionally, the fifth activity, Decommission, is outside the scope of the Business Process Reengineering (BPR) initiative of this thesis and as such is also not captured in the process models.

2. Process Model Assumptions and Constraints

The IA C&A process at the TSO-KC proved difficult to model for two main reasons: 1) One iteration requires an extremely lengthy process time (over 180 days per process instance); and 2) A high degree of variability exists among the actors in the process, both in terms of experience (knowledge) and cost. Additionally, knowledge value added does not necessarily correlate with increased cost.

While the Savvion Process Modeler software accurately captures process work flows, time, and costs, appropriate modeling necessitated that some assumptions be incorporated into both the current and desired model states. To compensate for the inherent complexity in this process and to overcome limitations in the Savvion process modeler, each process model was implemented under the following assumptions and constraints:

- Iteration Frequency: New process iterations have a normally distributed arrival frequency of 30 consecutive days (240 hours), with a standard deviation of one full work week (40 hours).
- Process Model Time: The TSO-KC operates on eight hour days, five days a week (i.e., 40-hour work weeks) year round. 50 work weeks compose a single work year. Because the Savvion Process Modeler does not support Business time, the above time constraints are converted from the constant 24-hour day of the modeler.
- Activity Time: Activity times are estimated <u>actual</u> work time for the actor(s) to complete the task. Elapsed time is captured through overall activity duration. For example, it may take the CA a full work day (eight hours) to complete a task, but due to other priorities, the overall duration of the activity may last a full work week (40 hours). To effectively capture this aspect of the process, each activity is time constrained by three aspects: Duration, Work Time, and Randomization Criteria.

- Duration is the expected amount of time required to complete an instance of a particular activity. Duration determines the due date for activity completion.
- Work Time is the amount of time actually required to complete an activity. Work Time is affected by the Randomization Criteria imposed on the activity.
- Randomization Criteria incorporates variation in Work Time for a particular activity. The Randomization Criteria for all activities in both the current “As-Is” and desired “To-Be” process models is normally distributed.

Pay and Compensation: Participants of different grade and experience are used interchangeably in the process (particularly in the IAO billet of the current “As-Is” model). To compensate for and provide continuity throughout all three process models, all personnel involved in the TSO-KC IA C&A process are tied to salaries based on the United States Office of Personnel Management January 2009 hourly basic rates pay chart. Figures are in 2009 dollars and do not reflect inflation regardless of the iteration process length. All General Schedule (GS) ratings are based at Step One. Locality pay, bonuses, and incentive payments are not factored into the model. Additionally, if an actor role is external to the IA C&A process in a given model (the CAA, DAA, or members of the MCEN C&A Team), then their salary is removed from the process cost since the TSO-KC does not provide funding for these personnel. Table 3 illustrates the associated personnel costs for (not all personnel play a role in every model).

Role	Pay Grade	Hourly Basic Rate	Annual Salary	Remarks
PM	GS-12	$28.45	$59,383.00	Internal to all Models
IAM	GS-12	$28.45	$59,383.00	Internal to all Models
IAO	GS-11	$23.74	$49,544.00	Collateral Duty (not captured) in “As-Is” Model
User Rep	GS-5	$12.95	$27,026.00	Internal only to Desired Models
Validator	GS-10	$21.61	$45,095.00	Internal only to Desired Model Version A
CA Rep	GS-12	$28.45	$59,383.00	Internal only to Desired Model Version A
MCEN C&A Team	N/A	$0.00	$0.00	External Actors (cost not captured)
CA	N/A	$0.00	$0.00	External Actor (cost not captured)
DAA	N/A	$0.00	$0.00	External Actor (cost not captured)

Table 3. Personnel costs in the Process Models

Factors unique to the Current “As-Is” Model: The current “As-Is” model captures real-world information on the process as it actually exists (through interviews with actual personnel involved in the process). Initial observations of the current process are as follows (these observations are considered when determining elapsed times and activity durations):

- Actors use email to send documents; no collaborative workspace exists to track receipt or location of documents.
- Although XACTA has been procured to track the C&A process, it is not currently implemented. Because of the lack of a formal progress tracking system, revision control issues arise through the use of Excel spreadsheets.
- The IAM is not part of the CCB. The IAM has to work reactively rather than proactively.
- There is no formal training for IAOs; the IAM only gives the IAO an appointment letter. Since it's a collateral billet and the IAM is outside the IAOs immediate chain of command, that appointment letter does not necessarily have a high priority. Because IAOs vary (in experience and pay scale) by division, the process has a high degree of variability.

B. PROCESS MODELS

1. TSO-KC Current “As-Is” Process Model

Although DoDI 8510.01 officially retired the DITSCAP and initiated the DIACAP in November 2007, the actual transition has been slow to implement throughout the DoD. As of the date of this thesis, the majority of units in both the Navy and the Marine Corps are using a DITSCAP-DIACAP hybrid or still using the DITSCAP altogether (K. Burke, personal communication, 22 April 2009). The TSO-KC, while incorporating the DIACAP terminology in their C&A effort, has implemented it with DITSCAP procedures.

Completing the DIACAP at the TSO-KC is personality driven. As detailed in Chapter I, the Information Assurance Manager (IAM) and Information Assurance Officer (IAO) complete the majority of the process. The Program Manager (PM) does not engage in the IA C&A effort to a very high degree. No User Representative is present. All IAOs are implemented as a collateral duty, drawn from one of the TSO-KC’s eight divisions.

The TSO-KC currently does not have an Echelon II Major Subordinate Command (MSC) to review DIACAP packages prior to submission to HQMC C4. The IAM and IAO work directly with the Marine Corps Enterprise Network (MCEN) C&A Team and Marine Corps Systems Command (MARCORSYSCOM) to complete the DIACAP activities.

While not expressed as a specific activity, the process model captures factors unique to the current "As-Is" model throughout all three activities in the form of duration, work time, and randomization criteria. Although the current "As-Is" Savvion process model for the TSO-KC DIACAP is executed as all three activities, Figures 14–16 break down each of them for better understanding of each individual activity.

Activity One of the current "As-Is" process model initiates with a DIACAP requirement for a new system or reaccreditation of an active system. The Program Manager (PM) registers the system with the DoD Information Technology Portfolio Repository - Department of the Navy (DITPR-DON). The DITPR-DON Registry is one of the DoD's authoritative inventories of IT systems used to support the certification process service-wide; registering systems with DITPR-DON is a requirement for all IT systems.

Other than registering the system in DITPR-DON, the PM plays a limited role in the C&A effort. Later in the process, the PM reviews the preliminary System Identification Profile (SIP), then reviews and approves the SIP and the DIACAP Implementation Plan (DIP), but the current process relies on the Information Assurance Manager (IAM) and Information Assurance Officer (IAO) to accomplish the majority of the processes involved. The TSO-KC does not currently incorporate a User Representative into the process, and all other involved actors are external to the TSO-KC. As stated in Chapter II, all subsequent activities are dependent on the successful completion of the first activity. If the C&A plan developed in activity one is defective, the remainder of the activities will be faulty as well.

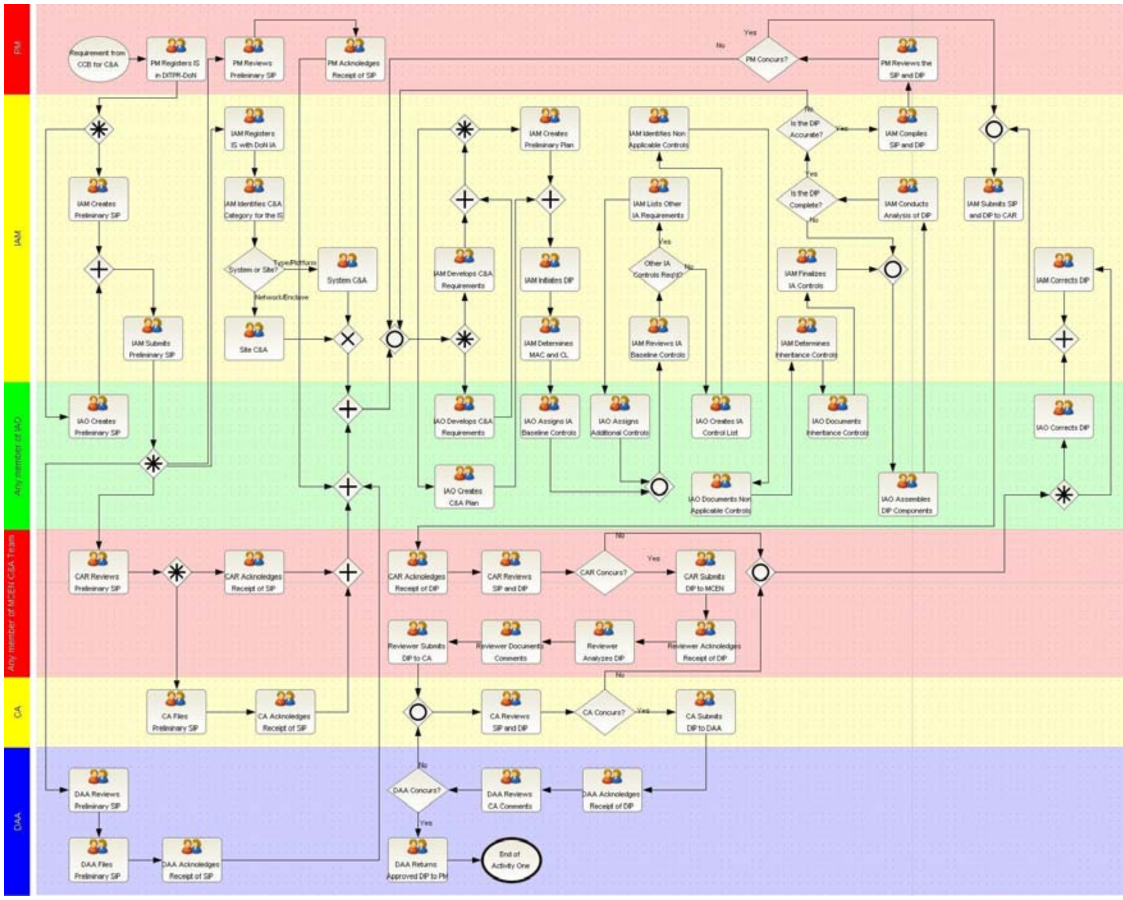

Figure 14. Current “As-Is” TSO-KC DIACAP Activity One

The current “As-Is” model for the first DIACAP activity involves a total of 52 activities and 8 decision points. The distribution of these activities and decision points, along with respective percentages of the total, are outlined in Table 4. The IAM and IAO workloads encompass over half of all activities, and the IAM comprises half of all decisions for this section of the “As-Is” process.

	PM	IAM	IAO	External Actors	Total
Activities	4 (7.69%)	19 (36.54%)	10 (19.23%)	19 (36.54%)	52 (100.00%)
Decisions	1 (12.50%)	4 (50.00%)	0 (0.00%)	3 (37.50%)	8 (100.00%)

Table 4. Current “As-Is” Activity One activities and decision points

Activity Two of the current “As-Is” process model executes the DIP and implements an Information Assurance (IA) Control Plan. The PM plays no role in this activity other than passing the approved DIP from the Marine Corps Enterprise Network (MCEN) Designated Approving Authority (DAA) to the IAM for execution. The IAM and the IAO build, implement, test, monitor, and document the IA controls for the IS. Validation of these controls, however, is passed to the MCEN C&A Team, an external organization to, and therefore outside of the purview of, the TSO-KC.

After the IAM submits the C&A Plan to MCEN, a Validator is assigned. The IA Controls are reviewed, validated, and documented. The Validator identifies vulnerabilities and determines discrepancies that the IAO and IAM must correct. If unmitigated risks exist, the IAO and IAM determine if the existing plan can be corrected and proceed or if the plan must be reworked entirely.

After the IA controls are validated, actual results are analyzed. Successful IA controls are recorded in the DIACAP Scorecard. The Validator assigns severity codes and documents risk levels of the C&A package, and submits a report to the IAM. Noncompliant controls, if any, are documented in a Plan of Action and Milestone (POA&M) document for reassessment and re-implementation by the TSO-KC. The C&A package cannot continue past activity two until all unmitigated risks are addressed. After the C&A package is compiled and both the IAO and IAM perform a final review, the IAM submits the C&A package to the Certifying Authority Representative (also at the MCEN) to begin activity three.

Activity two is time critical because it entails a high degree of interaction between the TSO-KC and the MCEN. In the current “As-Is” model, the IAM and IAO communicate directly with various external actors at the MCEN.

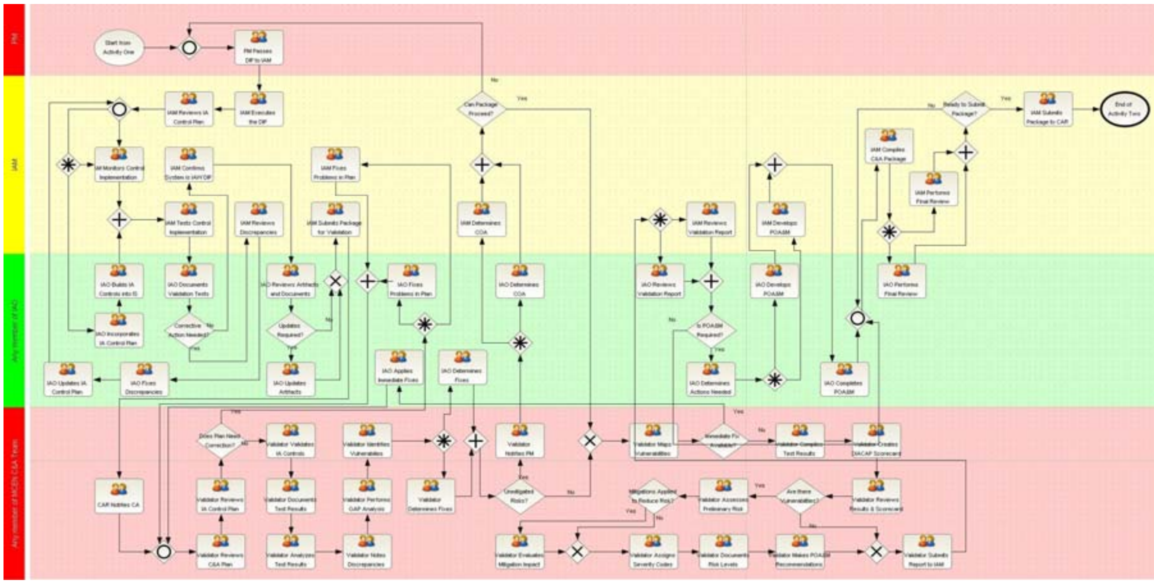

Figure 15. Current “As-Is” TSO-KC DIACAP Activity Two

The current “As-Is” model for the second DIACAP activity executes a total of 52 activities and 10 decision points. The distribution of these activities and decision points, along with respective percentages of the total, are outlined in Table 5. The IAM and IAO perform nearly sixty percent of the activities, and half of all decisions for this section of the “As-Is” process. All but one of the activities and all the decisions performed by external actors in activity two are accomplished by the MCEN Validator.

	PM	IAM	IAO	External Actors	Total
Activities	1 (1.92%)	14 (26.92%)	16 (30.77%)	21 (40.38%)	52 (100.00%)
Decisions	0 (0.00%)	2 (20.00%)	3 (30.00%)	5 (50.00%)	10 (100.00%)

Table 5. Current “As-Is” Activity Two Activities and Decision Points

Activity Three of the current “As-Is” process model begins when the IAM submits the C&A package to the MCEN CAR to initiate the certification determination process. The CAR prioritizes the TSO-KC DIACAP package against all other packages submitted by Marine Corps units, and reviews it. If errors in the package exist, the IAM, IAO, and CAR determine if the package can continue or if it requires corrective action.

After the CAR analyzes, documents, and makes a certification determination on the C&A package, a MCEN analyst assesses its residual risk and drafts an accreditation decision. If the CA concurs with the certification determination and accreditation decision, the package moves forward to the MCEN DAA for final approval. The DAA issues one of four accreditation decisions based on the mission need and level of acceptable residual risk of the site or system.

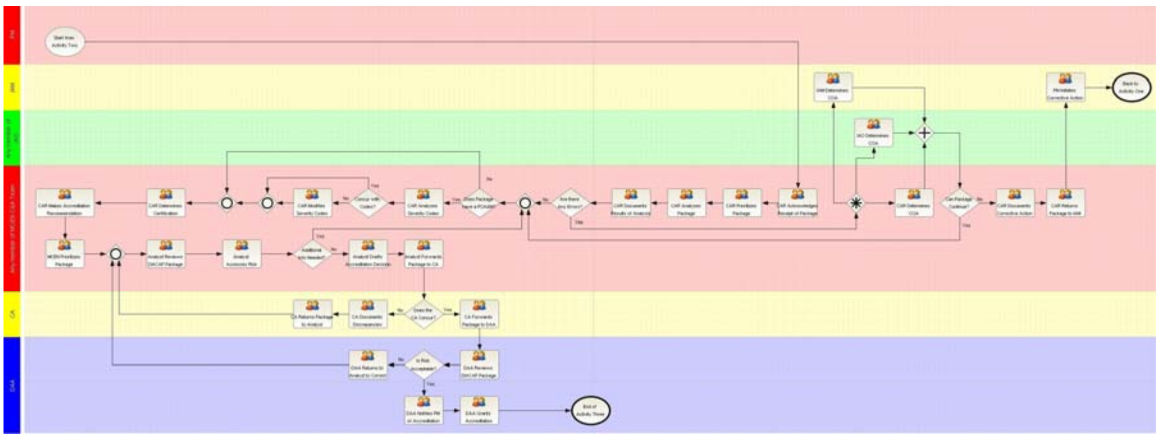

Figure 16. Current “As-Is” TSO-KC DIACAP Activity Three

The current “As-Is” model for the third DIACAP activity comprises a total of 26 activities and 7 decision points. The distribution of these activities and decision points, along with respective percentages of the total, are outlined in Table 6. The IAM and IAO are the only internal actors involved, performing just over ten percent of the activities. All other elements (every decision and nearly 90 percent of the activities) for this section of the “As-Is” process are performed by external actors. Due to variation in MCEN C&A Team personnel, activity three consumes a disproportionate amount of time in the overall C&A process. Personnel at the TSO-KC refer to the external portion of this activity as a “black hole” in which information is often becomes convoluted, misinterpreted, or lost.

	PM	IAM	IAO	External Actors	Total
Activities	0 (0.00%)	2 (7.69%)	1 (3.85%)	23 (88.46%)	26 (100.00%)
Decisions	0 (0.00%)	0 (0.00%)	0 (0.00%)	7 (100.00%)	7 (100.00%)

Table 6. Current “As-Is” Activity Three Activities and Decision Points

2. Desired “To-Be” Process Models

The desired “To-Be” process models, although derived from the current “As-Is” model, are generated side by side with the current model. Creating all three models in parallel ensures that any aspects of the processes outside of the BPR initiatives remain constant for both desired models, allowing the results of each final version to be compared with one another in a more objective fashion.

The desired “To-Be” process models deviate from the current “As-Is” process model in several ways, each incorporating different levels of BPR initiatives. The desired process models are based on the same criteria as the current model, but also include distinct features not present in the current model. These models are run and analyzed to determine their affects on the current environment.

As with the previous process model, the desired “To-Be” Savvion process models for the TSO-KC DIACAP are executed as continuous processes, but are also segregated into individual activities to facilitate better comprehension of the process flows. Figures 17 through 22 detail each activity of the versions A and B of the desired “To-Be” process model.

Similar to the current “As-Is” model, the catalyst for the first activity of the desired “To-Be” process model version A is an initial accreditation for a new system or reaccreditation of an active system. In this model, though, the PM plays a more significant role and additional internal actors are introduced. This process model

incorporates the use of a User Representative and integrates the Certifying Authority Representative and Validator functions as organic to the TSO-KC. The CA and DAA remain independent from the TSO-KC to prevent a conflict of interest.

The PM registers the system with DITPR-DON as well as the DON Application and Database Management System (DADMS), which helps to track system accountability and compliance. The PM, IAM, and IAO work closely together to create the entire C&A plan. The User Rep reviews the SIP and DIP to ensure that proposed IA controls do not negate acceptable system performance for the system's end user.

In this model, the TSO-KC acts as its own MSC and employs a CAR. After concurring with the DIP and SIP, the CAR forwards the IA C&A documents to the MCEN. Activity one ends when the DAA returns the approved DIP to the PM.

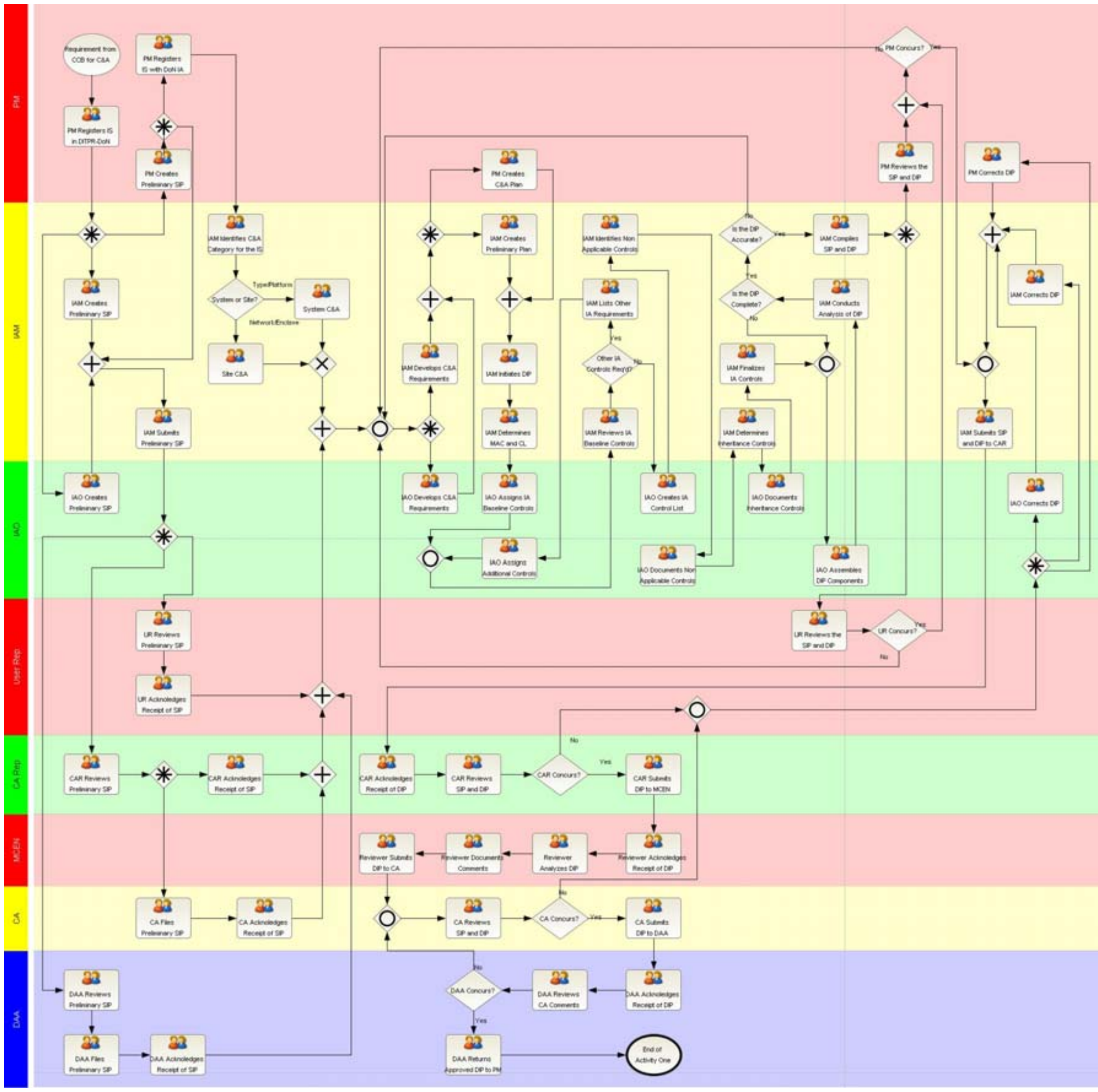

Figure 17. Desired "To-Be" TSO-KC DIACAP Activity One (Ver. A)

The desired "To-Be" model version A for the first DIACAP activity involves a total of 55 activities and 9 decision points. The distribution of these activities and decision points, along with respective percentages of the total, are outlined in Table 7. The TSO-KC workload for this section of the "To-Be" process comprises approximately 75 percent of all activities and nearly 80 percent of all decisions, as opposed to less than 65 percent of the activities and decisions in the "As-Is" version of the process model.

	PM	IAM	IAO	UR	Validator	CAR	External Actors	Total
Activities	6 (10.91%)	18 (32.73%)	9 (16.36%)	3 (5.45%)	0 (0.00%)	5 (9.09%)	14 (25.45%)	55 (100.00%)
Decisions	1 (11.11%)	4 (44.44%)	0 (0.00%)	1 (11.11%)	0 (0.00%)	1 (11.11%)	2 (22.22%)	9 (100.00%)

Table 7. Desired "To-Be" Activity One Activities and Decision Points (Ver. A)

Activity two of the desired "To-Be" process model version A executes in a similar fashion to the current "As-Is" model, but includes the PM and User Rep in more activities and decision points. The PM, rather than the IAM, executes the DIP. The IAM and IAO implement the IA Control Plan and build the IA controls.

In this version of the desired "To-Be" process model, validation of the IA controls remains internal to the TSO-KC. After the IAM submits the C&A package to the CAR to initiate validation, the CAR notifies the MCEN CA and then tasks the TSO-KC Validator.

If the C&A plan needs correction, the Validator passes the package to the IAM and IAO for immediate corrective action. If unmitigated risks exist, the PM determines a course of action with the IAO and IAM. The PM also contributes to the POA&M to correct any noncompliant controls. As with the current "As-Is" model, the IAM and IAO perform a final review of the C&A package. In version A of the desired model, however, both the User Rep and the PM must review and approve the C&A package prior to submission to the CAR to begin activity three.

Activity two focuses on implementing and validating IA controls, and involves the coordination of multiple players to succeed. Version A of the desired "To-Be" model concentrates on simplifying the communication among relevant actors in the process by keeping the majority of activities organic to the TSO-KC.

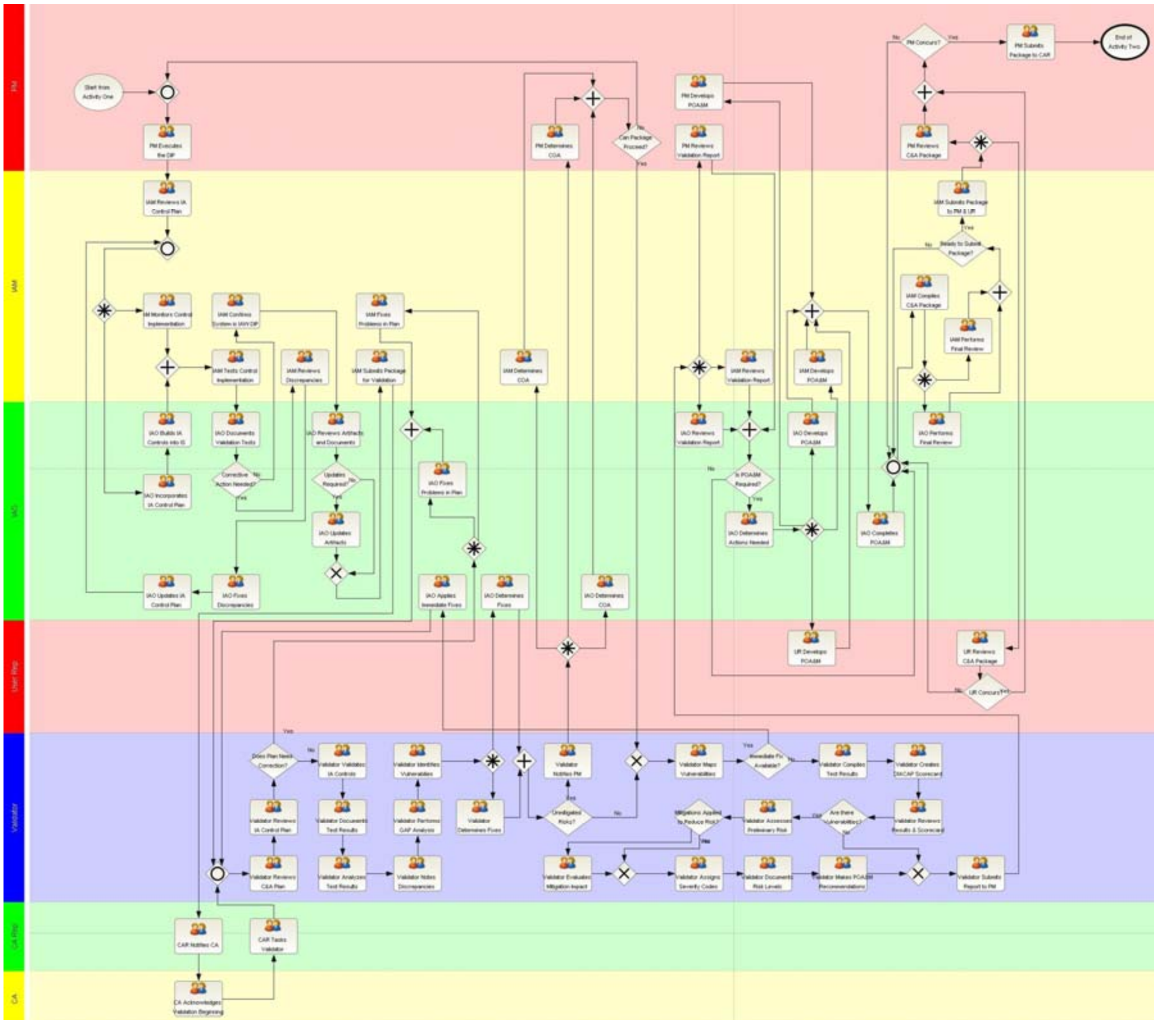

Figure 18. Desired "To-Be" TSO-KC DIACAP Activity Two (Ver. A)

The desired "To-Be" model version A for activity two executes a total of 60 activities and 12 decision points. The distribution of these activities and decision points, along with respective percentages of the total, are outlined in Table 8. Version A of the desired "To-Be" model for this activity requires eight additional activities and two additional decision points over the current model.

The majority of the additional activities and decision points in version A of the desired model are due to the incorporation of a User Rep and the PMs increased

involvement in the overall process. Additionally, this version of the desired “To-Be” process model transfers nearly every activity (over 98 percent) and every decision (100 percent) to the purview of the TSO-KC.

	PM	IAM	IAO	UR	Validator	CAR	External Actors	Total
Activities	6 (10.00%)	13 (21.67%)	16 (26.67%)	2 (3.33%)	20 (33.33%)	2 (3.33%)	1 (1.67%)	60 (100.00%)
Decisions	2 (16.67%)	1 (8.33%)	3 (25.00%)	1 (8.33%)	5 (41.67%)	0 (0.00%)	0 (0.00%)	12 (100.00%)

Table 8. Desired “To-Be” Activity Two Activities and Decision Points (Ver. A)

Activity three of the desired “To-Be” process model version A also transfers the CAR activities from MCEN to the TSO-KC. The CAR now prioritizes the DIACAP package against only other TSO-KC packages, not all packages submitted Marine Corps wide. If errors exist in the package, the PM contributes to determining the course of action with the IAM, IAO, and CAR.

After the CAR makes a certification determination, the C&A package passes from the TSO-KC to the MCEN where the package is prioritized and assigned an analyst to draft an accreditation decision. At this point, the process flow of the desired “To-Be” model version A mirrors that of the current “As-Is” process model. The analyst forwards the package to the CA, who subsequently forwards it to the MCEN where one of four accreditation decisions is assigned.

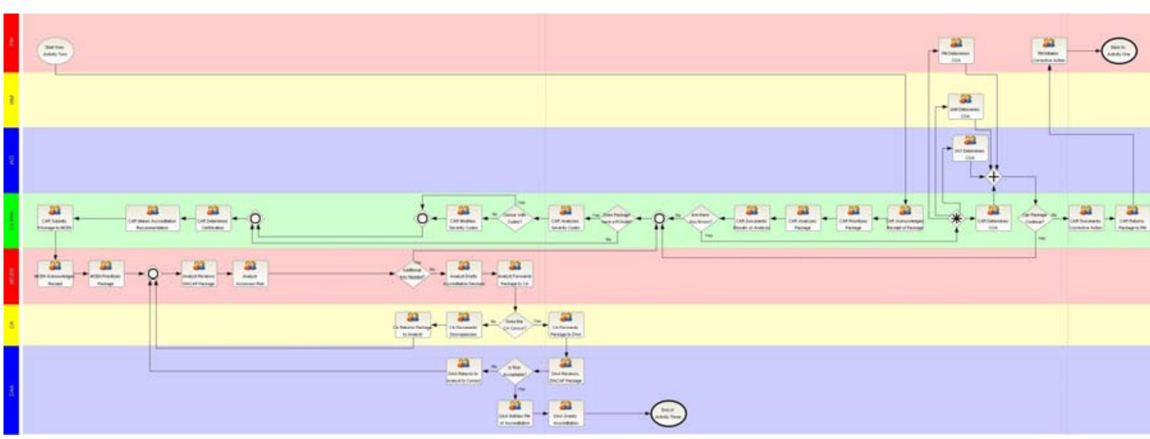

Figure 19. Desired “To-Be” TSO-KC DIACAP Activity Three (Ver. A)

The desired “To-Be” model version A for this activity has 29 activities (three more than the current “As-Is” model) and 7 decision points (the same amount as the current model). The additional activities are due to the PM’s inclusion in correcting any errors and in transferring the package from the TSO-KC to the MCEN; in the current model, package transfer was accomplished at the end of activity two. The distribution of these activities and decision points, along with respective percentages of the total, are outlined in Table 9. The TSO-KC controls over half of the activities and decisions for this section of the “To-Be” process model, opposed to slightly over ten percent of the activities and no decisions in the current model.

	PM	IAM	IAO	UR	Validator	CAR	External Actors	Total
Activities	2 (6.90%)	1 (3.45%)	1 (3.45%)	0 (0.00%)	0 (0.00%)	12 (41.38%)	13 (44.83%)	29 (100.00%)
Decisions	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	4 (57.14%)	3 (42.86%)	7 (100.00%)

Table 9. Desired “To-Be” Activity Three Activities and Decision Points (Ver. A)

Version B of the desired “To-Be” process model takes a less radical approach than version A in applying Business Process Reengineering (BPR) to the TSO-KC C&A process. As with version A, the User Rep is introduced and the PM takes a more predominant role in the overall process. Also like version A, this process model alters the role of the IAO by removing the eight collateral billets and implementing four primary billets. External activities, decisions, and roles outlined in the current “As-Is” process remain unchanged in the desired “To-Be” process version B.

The first activity of the desired “To-Be” process model initiates and plans the IA C&A plan. The PM registers the system with DITPR-DON and DADMS. The PM, IAM, and IAO create the C&A plan. The User Rep must concur with the SIP and DIP prior to the IAM submitting them to the MCEN CAR. After submission, the remainder of activity one is completed by actors external to the TSO-KC.

At the MCEN, the IA C&A documentation passes from the CAR to the CA to the DAA. Upon concurrence, the DAA returns the approved DIP to the PM for action.

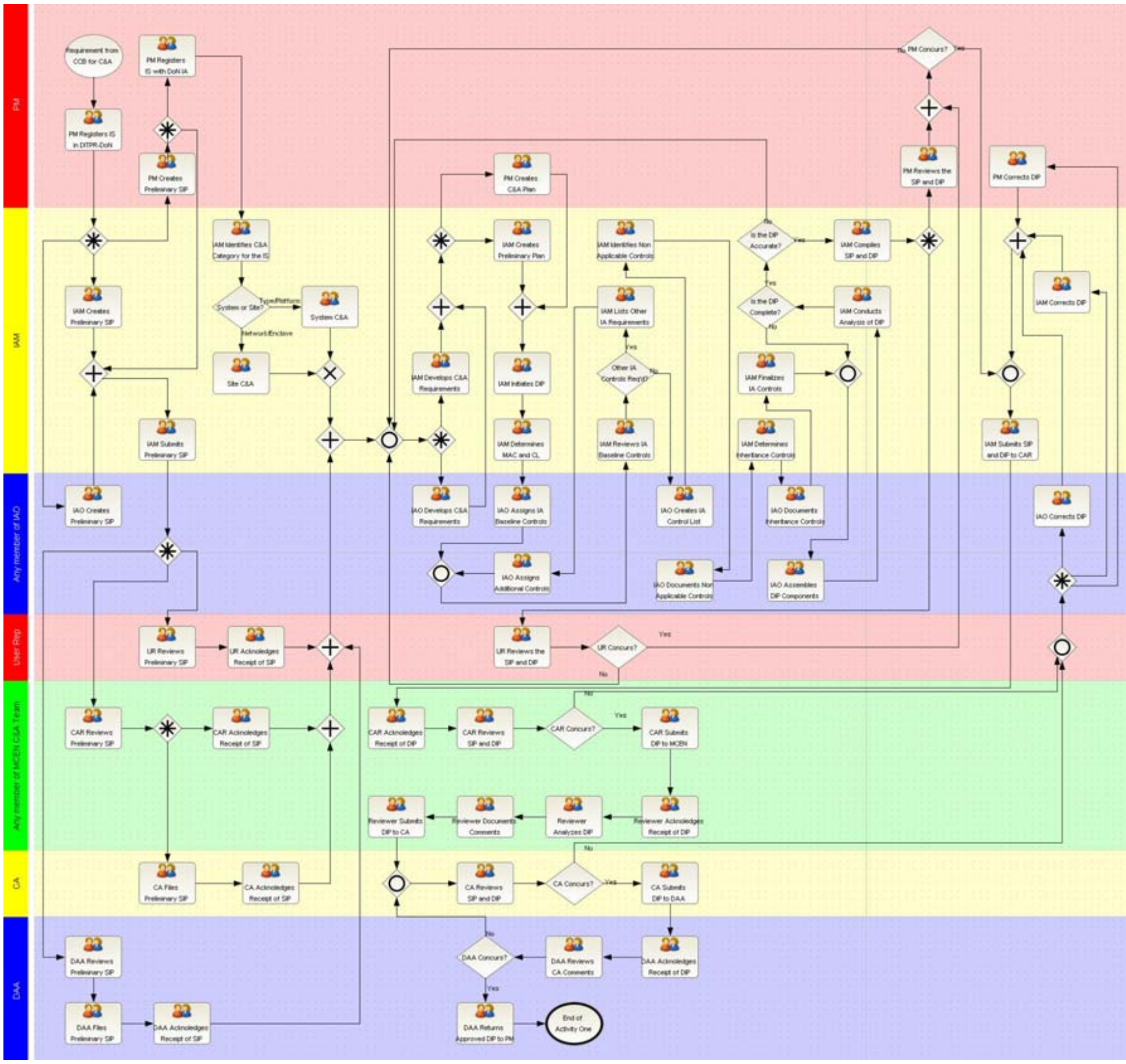

Figure 20. Desired “To-Be” TSO-KC DIACAP Activity One (Ver. B)

The desired “To-Be” model version B for the activity one consists of 55 activities and 9 decision points. The distribution of these activities and decision points, along with respective percentages of the total, are outlined in Table 10. Activity and decision point allocation of the “To-Be” version B model in this activity is similar to the “As-Is” version of the process model.

	PM	IAM	IAO	UR	External Actors	Total
Activities	6 (10.91%)	18 (32.73%)	9 (16.36%)	3 (5.45%)	19 (34.55%)	55 (100.00%)
Decisions	1 (11.11%)	4 (44.44%)	0 (0.00%)	1 (11.11%)	3 (33.33%)	9 (100.00%)

Table 10. Desired "To-Be" Activity One Activities and Decision Points (Ver. B)

In activity two, Version B of the desired "To-Be" process model is identical to version A in function and execution. The only differences are that in version B, the CAR and Validator belong to the MCEN rather than the TSO-KC.

Validation of the IA controls is external to the TSO-KC. The IAM submits the C&A package to the MCEN CAR, the CAR notifies the CA, and validation is executed at the MCEN.

Once validation is complete, members of the TSO-KC compile and review the entire C&A package for submission to the MCEN CAR to begin activity three.

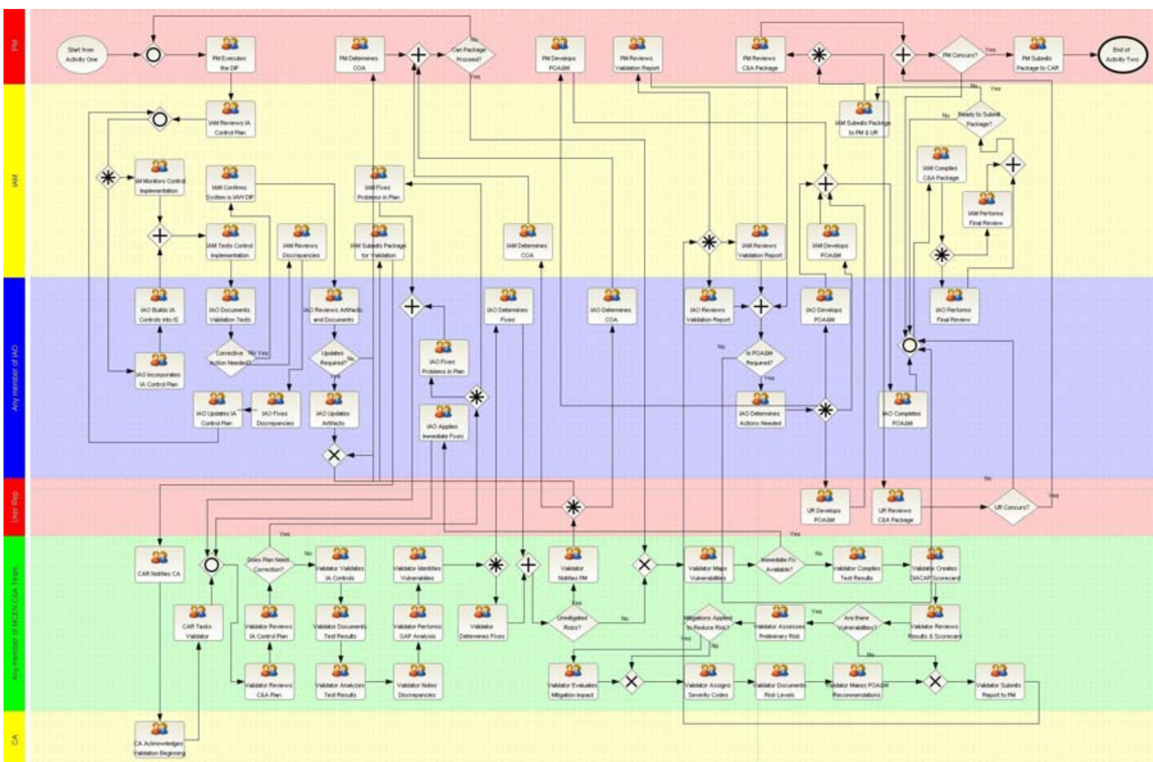

Figure 21. Desired "To-Be" TSO-KC DIACAP Activity Two (Ver. B)

Like version A, version B of the desired “To-Be” model for activity two executes a total of 60 activities and 12 decision points. The distribution of these activities and decision points, along with respective percentages of the total, are outlined in Table 11. Version B requires additional activities and decision points over the current “As-Is” model for this activity but percentages of responsibility allocation between the TSO-KC and external players is similar to the current model.

	PM	IAM	IAO	UR	External Actors	Total
Activities	6 (10.00%)	13 (21.67%)	16 (26.67%)	2 (3.33%)	23 (38.33%)	60 (100.00%)
Decisions	2 (16.67%)	1 (8.33%)	3 (25.00%)	1 (8.33%)	5 (41.67%)	12 (100.00%)

Table 11. Desired “To-Be” Activity Two Activities and Decision Points (Ver. B)

Just as version B of the desired “To-Be” process model closely approximates version A in activity two, version B also correlates to the current “As-Is” model in activity three. The third activity of version B of the desired “To-Be” process model executes almost entirely externally to the TSO-KC. The only TSO-KC functions are determining action and initiating corrective measures if the MCEN CAR deems that errors in the package exist.

The remainder of the version B process flow in activity three is identical to the current “As-Is” process model. It is complete when the DAA issues one of the four DIACAP accreditation decisions described in Chapter II.

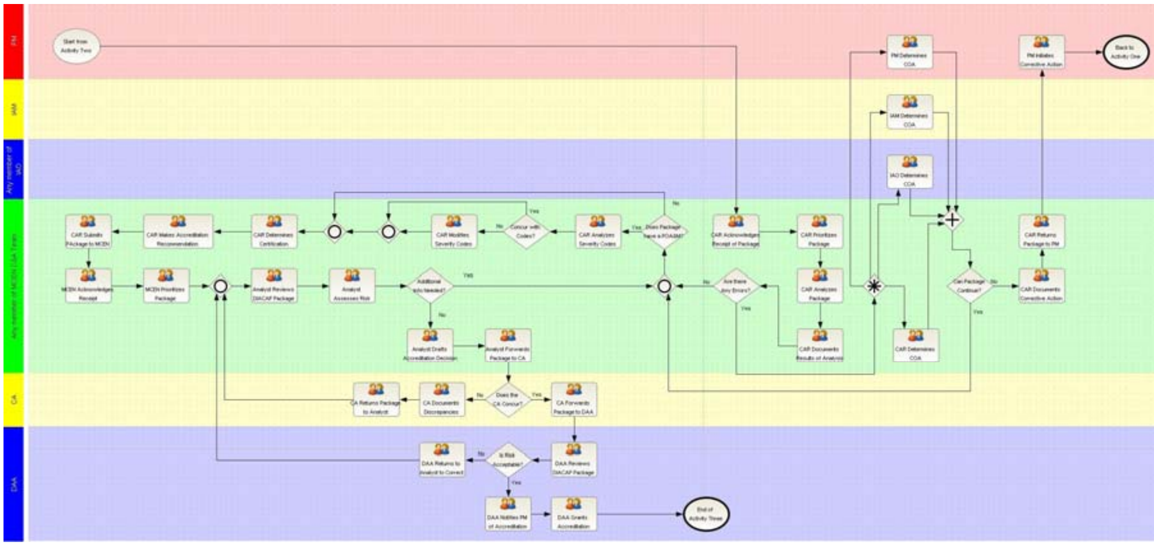

Figure 22. Desired “To-Be” TSO-KC DIACAP Activity Three (Ver. B)

Version B of the desired “To-Be” model for the third DIACAP activity involves a total of 29 activities and 7 decision points. The distribution of these activities and decision points, along with respective percentages of the total, are outlined in Table 12. The TSO-KC plays a minimal role in activity three. All other elements (every decision and over 85 percent of the activities) for this section of the version B “To-Be” process are performed by external actors. The process flow does not address the variation in MCEN C&A Team personnel, so activity three of version B continues to have potential for consuming a disproportionate amount of time in the overall C&A process.

	PM	IAM	IAO	UR	External Actors	Total
Activities	2 (6.90%)	1 (3.45%)	1 (3.45%)	0 (0.00%)	25 (86.21%)	29 (100.00%)
Decisions	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	7 (100.00%)	7 (100.00%)

Table 12. Desired “To-Be” Activity Three Activities and Decision Points (Ver. B)

Versions A and B of the desired “To-Be” model both incorporate aspects of BPR initiatives, but to varying degrees. Although both desired process models reflect several similar alterations from the current model, version A of the desired “To-Be” process

model deviates from the current “As-Is” model to a greater extent than version B. Table 13 compares the current model to the desired models, listing the general differences between the current “As-Is” and each version of the desired “To-Be” models.

	"As-Is"	"To-Be" (Version A)	"To-Be" (Version B)
Total # of IAO Actors:	8 (Collateral Duty)	4 (Primary Duty)	4 (Primary Duty)
Validator Actor:	No (TSO-KC External)	Yes (TSO-KC Internal)	No (TSO-KC External)
CA Representative Actor:	No (TSO-KC External)	Yes (TSO-KC Internal)	No (TSO-KC External)
Total # of TSO-KC Actors:	10 (2 primary; 8 collateral)	9 (all primary)	7 (all primary)
Total # of TSO-KC Activities:	67 of 130 (51.54%)	116 of 144 (80.56%)	77 of 144 (53.47%)
Total # of TSO-KC Decisions:	10 of 25 (40.00%)	23 of 28 (82.14%)	13 of 28 (46.43%)
Additional Annual Cost to Implement (Est):	$0 (Baseline Model)	$329,680.00	$225,202.00

Table 13. General Comparison of the “As-Is” and “To-Be” Process Models

Both versions of the desired “To-Be” process model require the IAO to be a primary duty. The estimated additional annual cost to implement each version is based on salaries from the United States Office of Personnel Management January 2009 annual salary table. All estimations are based on Step One General Schedule (GS) ratings without locality pay, bonuses, or incentive payments. These annual estimates do not include funds for the PM or IAM because those costs are captured in the current “As-Is” version of the process model and as such are not considered as “additional” costs above the current costs already incurred by the TSO-KC.

Version A of the desired “To-Be” process model requires funding for:

- 4 X IAO (GS-11) ($198,176/year)
- 1 X User Rep (GS-5) ($27,026/year)
- 1 X Validator (GS-10) ($45,095/year)
- 1 X CA Rep (GS-12) ($59,383/year)

Version B of the desired “To-Be” process model requires funding for:

- 4 X IAO (GS-11) ($198,176/year)
- 1 X User Rep (GS-5) ($27,026/year)

Funding for the MCEN C&A Team, the CA, and the DAA are not provided by the TSO-KC and therefore are not included in any of the process models. Refer to Table 3 for the costs associated with the GS ratings used for all process models.

In addition to reconfiguring billet assignments and restructuring certain process activities, both versions of the "To-Be" process rely more heavily on Information Technology. The Xacta software tool described in Chapter II is implemented at the TSO-KC in both versions of the "To-Be" process models. The addition of automatic C&A submission and status tracking software requires additional training for personnel at the TSO-KC. This additional training is discussed in Chapter IV.

C. INTENDED IMPROVEMENTS OF THE BPR INITIATIVE

As stated in Chapter I, the TSO-KC develops and maintains pay, personnel accounting, and financial systems for both active and reserve components of the Marine Corps. As part of accomplishing this mission, the TSO-KC must also ensure that the DIACAP is successfully applied to all systems within its purview. While the TSO-KC is capable of achieving certification and accreditation on its systems, research indicates that aspects of Business Process Reengineering (BPR) can improve areas of the IA C&A process to decrease process time and reduce process costs.

Business Process Reengineering (BPR) is defined as "The critical analysis and radical redesign of existing business processes to achieve breakthrough improvements in performance measures." (Teng et al., 1994, p.10)

Another reference defines BPR as, "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed" (Hammer and Champy, 1993).

The application of BPR is not intended to be a slow, cumulative, or incremental process. BPR, by the definitions cited above, is designed to achieve radical, transformational improvements on a given process. In applying BPR to the TSO-KC IA C&A process, this thesis analyzes the Knowledge Value Added (KVA) to the process.

By analyzing the KVA to the TSO-KC IA C&A process, the Return on Knowledge (ROK) and Return on Investment (ROI) of specific sub-processes within a particular business process are measured and compared between the current “As-Is” process and the desired “To-Be” processes. The result of this analysis seeks to demonstrate the two intended improvements of the BPR initiative stated earlier: A decrease in IA C&A process time and a reduction of DIACAP associated costs at the TSO-KC.

1. Desired End State

This thesis is developed at the request of the Deputy Director, TSO-KC, Programs and Resources Dept, HQMC. Therefore, the desired end state of this thesis is the actionable adoption of the recommendations presented in this thesis and the incorporation of its BPR initiatives, in whole or in part, into the IA C&A process at the TSO-KC, based on observed metrics of this thesis’ process models.

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IV. PROCESS MODEL EVALUATION AND ANALYSIS OF RESULTS

A. PROCESS MODEL EXECUTION

Each iteration in the process model execution represents a single DIACAP package. In the models, DIACAP packages are initiated approximately every 30 days. For the purpose of these models, the catalyst for package initiation and the type of accreditation each package eventually receives is irrelevant.

The process models are each executed through the Savvion Process Modeler for 100 iterations. As each instance in the IA C&A process requires a long process time, the number of iterations in the simulation represents an overall duration length of approximately 20 years. While 20 years is not considered realistic for the expected life span of an IT-related process, 100 iterations provides an adequate amount of data on which to base plausible observations.

After analyzing the "As-Is" process, this thesis concentrates on three aspects of change to re-engineer the IA C&A process: 1) Lean Theory, 2) Six Sigma, and 3) Radical BPR. Modifications unique to each model are discussed with the analysis of that model's simulation results. The following transformations are true for both versions of the desired "To-Be" process models:

- Lean Theory is implemented to remove waste. The number of IAOs is reduced from eight to four in order to save labor cost. The Xacta IA Manager software is implemented to automate the IA C&A process and provide DIACAP package version control.
- Six Sigma is applied to reduce variation. The IAOs work directly for the IAM to provide consistent management for the billet. Each IAO also undergoes 160 hours of formalized training to create a knowledge baseline. The PM billet receives 40 hours of supplemental training to provide consistency throughout those duties as well.

- Radical BPR of the process as a whole is applied to enable certain activities to move more efficiently through the process to save time and cost. Although version A of the "To-Be" model adopts a more radical approach to billet additions, the User Representative actor is integrated into the TSO-KC process in both "To-Be" models.

1. Process Model Metrics

A side-by-side comparison of all three process models appears at the end of this chapter. The results of each process model simulation are analyzed to determine several different metrics. These metrics present quantitative indicators of specific attributes; the measure and comparison of these properties determines recommendations and conclusions outlined in Chapter V. Several metrics are obtained by analyzing the Savvion Process Modeler output directly; these include:

- Process cost: The thesis captures only those costs incurred by the TSO-KC. Process costs for each model are calculated using the assumptions listed in table three of Chapter III.
- Process duration: Process duration represents the time required to complete all 100 iterations in the model. Because several iterations can occur at various points in the process model simultaneously and several tasks are accomplished in parallel, duration time is not equal to the sum of (but is much less than) the time it takes all actors to complete their respective activities.
- Personnel utilization: The model captures the utilization and idle percentages of each actor or group of actors in the process. In cases where an actor from a group of actors accomplishes an activity, the utilization percentage spans the number of actors in that group.
- Wait time: Wait time describes the amount of time that actors wait on other personnel to complete a task for an iteration in the process prior to being able to accomplish their own task(s) on that iteration. Wait time is expressed in hours. For contextual purposes, wait time is also explained in total weeks lost to waiting per year. For this explanation, wait time is calculated as a function of the number of years a particular model requires to perform 100 iterations. The three models each have unique process completion times and are therefore not directly comparable when discussing wait time in weeks lost per year.

- Process congestion: Bottlenecks that create congestion occur throughout the process. These bottlenecks result from iterations in the process having to wait at a beginning of a task for an actor to complete a prior iteration in that same task. The relationship between iterations and process congestion is similar to the relationship between actors and wait time.

As stated in Chapter I, this thesis' scope is to examine the TSO-KC IA C&A process and analyze it based on the Knowledge Value Added (KVA) methodology. The critical KVA metrics this thesis focuses on are:

- Actual Learning Time (ALT): ALT is an estimate of, based on interviews with Subject Matter Experts involved in the process, the actual time required to learn how to accomplish a task. ALT includes both formal and on-the-job training, but is not time spent accomplishing a task (i.e., only time spent learning). In the case where more than one actor can perform a task, ALT is the average learning time of all actors involved.
- Nominal Learning Time (NLT): NLT, also an estimate using the same parameters as ALT, allocates the total amount of knowledge among the tasks or actors in the overall process. This thesis focuses on personnel involved in the TSO-KC IA C&A process. Therefore, all activities are grouped by actor. NLT allocates a portion of the total knowledge in the IA C&A process to each actor or group of actors.
- Times Fired: Knowledge is leveraged every time an actor performs a task. Times Fired is a measure of the number of times an actor performs any task (and leverages knowledge) in the process. In this thesis, Times Fired is measured per hour. Based on the Savvion Process Modeler output, Times Fired per hour is the total tasks an actor performs for all iterations divided by the duration of entire process in hours.
- Number of Actors: Although some billets have multiple personnel (e.g., the IAO), each activity in all process models requires only one available actor from its respective group, rather than all actors in the group, to complete.
- Percentage of IT: The percentage of IT is a measure of how much an actor uses IT to accomplish all assigned tasks in the process. The percentage of IT can be described as either a "Minor Additive" or a "Knowledge Enhancer." The percentage of IT is also an estimation based on interviews with relevant Subject Matter Experts.
- Total Learning Time (TLT): TLT is a function of ALT and percentage of IT (computed as: TLT = ALT + (ALT*%IT)). TLT is used in calculating the Return on Knowledge (ROK) and Return on Investment (ROI).

- Total Output: The total amount of knowledge an actor requires for the entire process is expressed as the Total Output. As with the other variables in this analysis, Total Output is measured per hour. Total Output per Hour is the Times Fired per Hour multiplied by the Number of Actors multiplied by the TLT. Total Output is the numerator in the ROK ratio and denominator in the ROI ratio.
- Actual Work Time (AWT): AWT is the average amount of time an actor requires to accomplish each task in the process. Also based on the output from the Savvion Process Modeler, AWT is the sum of an actor's time spent working on activities divided by total number of times that actor fires knowledge throughout the process.
- Actual Activity Time: Actual Activity Time is the utilization of an actor or group of actors across all iterations during the entire process. Again, the unit of time used in this metric is per hour. For each actor, the Actual Activity Time per Hour is the Times Fired per Hour multiplied by the Actual Work Time.
- Total Input: The total amount of time an actor requires for the entire process is expressed as the Total Input. In this analysis, Total Input is measured per hour. Total Input per Hour is the Times Fired per Hour multiplied by the Number of Actors multiplied by the AWT. Total Input is the denominator in the ROK ratio and numerator in the ROI ratio.
- Return on Knowledge (ROK): The ROK returns a percentage that quantifies the relative efficiency of each actor (or group of actors) in the TSO-KC IA C&A process. ROK is the ratio of Total Output divided by the Total Input. This thesis concentrates on the TSO-KC. Where ROK is a factor, the conclusions and recommendations outlined in Chapter V are based on personnel organic to the TSO-KC only.
- Return on Investment (ROI): The ROI is a cost to benefit ratio and provides a measure of the value of the input into each actor (or group of actors) in relation to the output produced by that actor (or group of actors) in the TSO-KC IA C&A process. ROI is the ratio of Total Input (benefit) divided by the Total Output (cost). This thesis concentrates on the TSO-KC. Where ROI is a factor, the conclusions and recommendations outlined in Chapter V are based on personnel organic to the TSO-KC only.

B. ANALYSIS OF PROCESS MODEL SIMULATION RESULTS

1. Current “As-Is” Process Model

Several metrics are derived directly from analysis of the Savvion Process Modeler simulation results. The complete output of the Savvion “As-Is” process model is located in Appendix A. The “As-Is” model acts as a baseline for the IA C&A process.

The internal cost to the TSO-KC to process 100 DIACAP packages for accreditation in the “As-Is” model is just over $2.73 million. The duration time is 48,845 process hours, or 24.42 years, resulting in an annual cost of approximately $111,700.

Utilization of TSO-KC organic personnel in the “As-Is” model extends over a wide range. The Information Assurance Manager is occupied 98.5 percent of the time during the process. The Information Assurance Officer group, a collateral billet composed of eight personnel in the “As-Is” process, is employed for only 13.2 percent of the process time. (The total utilization percentage of 105 percent for the IAO spans across all eight players.) The Program Manager has a utilization rate of only ten percent throughout the “As-Is” model of the IA C&A process.

The average wait time per iteration in the “As-Is” model is over 194 hours. The wait time incurred results in the loss of slightly more than 19 total work weeks per year in the “As-Is” process model. Additionally, a total of 56 congestion points, 40 of which are internal to the TSO-KC, exist in the “As-Is” model. These internal bottlenecks cause congestion during the execution of a total of 206 tasks in the process over the course of 100 iterations.

Critical KVA metrics on which to base conclusions of the model are also calculated. Table 14 includes the detailed statistics of the “As-Is” process data. All activities are grouped by Performer. After analyzing the output from the Savvion Process Modeler, critical KVA metrics are calculated and summed for KVA analysis. IT is determined to be a minor additive for TSO-KC personnel at 15 percent. Comparing

Actual Learning Time to Nominal Learning Time reveals an 83 percent correlation. With the "As-Is" IA C&A process, the average Return on Knowledge across all actors is 13,846 percent, while the Cost to Benefit ratio is 48 percent.

Although total figures are included for comprehension and accuracy, comparisons between models and recommendations in Chapter V are based on TSO-KC personnel only. All pertinent TSO-KC data in Table 14 is listed in bold. Because the scope of this thesis concentrates just on the TSO-KC, the KVA analysis of these models likewise focuses only on TSO-KC organic personnel. The average Return on Knowledge and Cost to Benefit ratio across only the TSO-KC organic actors is 1,349 percent and 98 percent, respectively.

"As-Is" KVA Analysis (100 Iterations)										
Processes	ALT (Hours)	NLT	Times Fired per Hour	% IT	TLT (Hours)	Total Output per Hour	AWT (Hours)	Total Input per Hour	ROK	Cost to Benefit Ratio
Certifying Authority	640.0	20%	0.015	45%	928.0	13.95	2.49	0.04	37242%	0.27%
Designated Approval Authority	1440.0	30%	0.019	30%	1872.0	35.14	4.74	0.09	39517%	0.25%
Information Assurance Manager	**480.0**	**20%**	**0.066**	**15%**	**552.0**	**36.58**	**14.87**	**0.99**	**3711%**	**2.69%**
Information Assurance Officer	**8.0**	**15%**	**0.046**	**15%**	**9.2**	**3.40**	**22.78**	**8.42**	**40%**	**247.66%**
MCEN C&A Team	160.0	15%	0.090	50%	240.0	4339.60	10.56	191.02	2272%	4.40%
Program Manager	**24.0**	**0%**	**0.011**	**15%**	**27.6**	**0.29**	**9.35**	**0.10**	**295%**	**33.86%**
Sum (ROK & ROI are averages)	2752.0	100%			3628.8	4428.97		200.65	13846%	48%
Correlation	83%				83%		**TSO-KC Values:**		**1349%**	**95%**

Table 14. "As-Is" Process Model KVA Analysis

2. Desired "To-Be" Process Model (Ver. A)

In addition to applying the changes discussed at the beginning of this chapter, version A of the desired "To-Be" model takes action to dramatically alter the process flow. As stated earlier, Version A of this model adds the User Representative billet to the

TSO-KC. While the DIACAP functions to ensure the tenants of confidentiality, integrity, and availability are built into the system, the IS must also function as intended. The User Representative ensures that the IT system maintains functionality as IA Controls are implemented.

Version A also transfers two additional billets under the purview of the TSO-KC; these being the CA Representative and the Validator. Both of these actors allow the TSO-KC to act as its own Echelon II Major Subordinate Command (MSC) and buffer the disconnect between the TSO-KC and the MCEN. The nature of these relationships are allowable under the guidance described in DoD Instruction 8510.01 and detailed in table two of Chapter II (DoDI 8510.01, p. 15). The complete output of the Savvion "To-Be" process model version A is located in Appendix B.

Even though the TSO-KC incurs higher labor costs under version A of the "To-Be" model, the internal cost to the TSO-KC to process 100 DIACAP packages for accreditation is lower than the "As-Is" model, totaling $2.68 million. The duration time is also lower than that of the "As-Is" model. To complete 100 iterations, version A requires 37,622.5 process hours (18.81 years), resulting in an annual cost of approximately $142,600.

Although it includes more billets, personnel utilization of the same actors in this model is consistent with the "As-Is" model. Utilization of the IAM is 92.5 percent (down from 98.5 percent in the "As-Is"). The IAO group, now a primary billet of four personnel, is active 17.9 percent (up from 13.2 percent) of the process time. The PM shows the largest change with a usage of 29.4 percent (from ten percent) throughout version A of the "To-Be" IA C&A process model. Other actor utilization rates for this process model are 20.3 percent for the CA Representative, 11.3 percent for the User Representative, and 57.4 percent for the Validator. The deltas in the IAM, IAO and PM percentages are the result of a redistribution of workload from the IAM and IAO billets in the "As-Is" model. The IAO utilization rate increase is due to the reduction of actors in the group.

The average wait time per iteration in this “To-Be” model is just more than 108 hours, approximately 86 hours less than the “As-Is” model. This wait time translates to slightly over 14 work weeks lost per year. Lost time incurred through waiting is approximately five weeks less per year than the “As-Is” process model. The congestion points in the “To-Be” version A model number 110; the majority (94) are internal to the TSO-KC. These internal bottlenecks account for congestion during the execution of 317 tasks in the version A process over the course of 100 iterations.

The critical KVA metrics of the detailed statistics of the “To-Be” version A process data are outlined in table 15. Factors significant to the TSO-KC and of si The data summarized in table 14 is collected across all actors in the IA C&A process. Factors significant to the TSO-KC and of important value to this thesis are highlighted in the table. It is these aspects of the data from which conclusions will be drawn in Chapter V.

Due to the inclusion of the Xacta IA Manager, IT is considered a knowledge enhancer for the CA Rep (40 percent), IAM (45 percent), IAO (40 percent), and Validator (50 percent). IT is a minor additive for the PM and User Rep.

Actual Learning Time increases due to 160 hours of formalized training for the IAO and 40 hours of supplemental training for the PM. The correlation between Actual Learning Time and Nominal Learning Time improves from 83 percent in the “As-Is” model to 86 percent in version A of the “To-Be” model. The average Return on Knowledge and Cost to Benefit ratio across all actors is lower, but the average Return on Knowledge of just TSO-KC organic actors jumps from 1,349 percent to 4,348 percent. The Cost to Benefit ratio, which now includes the CA Rep and Validator (two external actors in the “As-Is” process, lowers from 98 percent to 21 percent.

"To-Be" (Version A) KVA Analysis (100 Iterations)										
Processes	ALT (Hours)	NLT	Times Fired per Hour	% IT	TLT (Hours)	Total Output per Hour	AWT (Hours)	Total Input per Hour	ROK	Cost to Benefit Ratio
Certifying Authority	640.0	10%	0.017	45%	928.0	15.59	2.77	0.05	33466%	0.30%
CA Representative	**480.0**	**10%**	**0.041**	**40%**	**672.0**	**27.67**	**4.94**	**0.20**	**13616%**	**0.73%**
Designated Approval Authority	1440.0	30%	0.024	30%	1872.0	45.63	4.76	0.12	39345%	0.25%
Information Assurance Manager	**480.0**	**15%**	**0.076**	**45%**	**696.0**	**53.02**	**12.15**	**0.93**	**5731%**	**1.75%**
Information Assurance Officer	**160.0**	**15%**	**0.053**	**40%**	**224.0**	**47.08**	**13.61**	**2.86**	**1646%**	**6.07%**
MCEN C&A Team	160.0	10%	0.029	50%	240.0	1393.21	14.66	85.11	1637%	6.11%
Program Manager	**40.0**	**5%**	**0.028**	**15%**	**46.0**	**1.28**	**10.61**	**0.29**	**434%**	**23.06%**
User Representative	**8.0**	**0%**	**0.014**	**15%**	**9.2**	**0.12**	**8.35**	**0.11**	**110%**	**90.73%**
Validator	**320.0**	**5%**	**0.054**	**50%**	**480.0**	**26.14**	**10.54**	**0.57**	**4553%**	**2.20%**
Sum (ROK & ROI are averages)	3728.0	100%			5167.2	1609.74		90.24	11171%	15%
Correlation	86%				85%		**TSO-KC Values:**		**4348%**	**21%**

Table 15. “To-Be” Process Model KVA Analysis (Ver. A)

3. Desired “To-Be” Process Model (Ver. B)

The BPR approach taken by Version B of the desired model requires less modification than version A. This version of the “To-Be” model incorporates the changes outlined at the beginning of this chapter, but otherwise leaves the process unaltered. Again, these changes are:

- Reduction of the IAO billet from eight collateral billets to four primary billets working directly for the IAM.
- Addition of the User Rep billet to the TSO-KC.
- Implementation of the Xacta IA Manager software.
- Formalized IAO training of 160 hours.
- Supplemental PM training of 40 hours.

The introduction of these changes to the “As-Is” model has dramatic affects on the process outcome. The complete output of the Savvion desired “To-Be” process model version B is located in Appendix C.

Initial analysis reveals that version B of the desired “To-Be” model is the most cost effective and time efficient of all the models. The TSO-KC internal cost to process 100 DIACAP packages for accreditation under version B of the desired model totals $1.97 million (a delta of more than $750,000 from the “As-Is” model and $700,000 from version A of the “To-Be” model). To complete 100 iterations, version B requires 35,092.5 process hours (17.55 years), resulting in an annual cost of roughly $112,700. Version B of the desired model completes 100 iterations 13,752.5 hours (almost seven years) and 2,530 hours (nearly 1.3 years) faster than the “As-Is” and version A “To-Be” models, respectively.

With version B of the desired process model, the IAM is almost fully exploited at 98.3 percent, although the IAM billet has strong utilization rates in all three models. The IAO group has its highest usage with this model at 19 percent (an increase from 13.2 percent in the “As-Is” model). The PM and User Rep billets show usage similar to those in version A of the “To-Be” model, with corresponding percentages of 31.1 and 11.8.

Version B of the desired model shows an average wait time per iteration of roughly 96 hours; this figure halves the wait time per iteration of the “As-Is” model and is a full 12 hours less than version A of the “To-Be” model. The wait time in this model equates to more than 13 work weeks lost per year, six weeks less per year than the “As-Is” process model. 68 congestion points appear in version B of the “To-Be” model; 53 of which are internal to the TSO-KC. These internal bottlenecks account for congestion during the execution of 158 tasks in this process model over the course of 100 iterations.

Table 16 lists the critical KVA metrics of the detailed statistics in the “To-Be” version B process model. In this model, IT is considered a knowledge enhancer for the IAM (45 percent) and IAO (40 percent). IT is a minor additive for the PM and User Rep (15 percent each).

As with version A of the “To-Be” model, the IAO’s Actual Learning Time is 160 hours; the PM’s is 40 hours. This model shows the highest correlation of all the process models between Actual Learning Time and Nominal Learning Time with 89 percent.

The average Return on Knowledge and Cost to Benefit ratio for the model as a whole is lower than the “As-Is” model. Upon examination of only actors internal to the TSO-KC, though, the average Return on Knowledge is 2,013 percent vice the 1,349 percent of the “As-Is” model. The Cost to Benefit ratio is still lower than the “As-Is” model, from 98 percent to 30 percent.

"To-Be" (Version B) KVA Analysis (100 Iterations)										
Processes	ALT (Hours)	NLT	Times Fired per Hour	% IT	TLT (Hours)	Total Output per Hour	AWT (Hours)	Total Input per Hour	ROK	Cost to Benefit Ratio
Certifying Authority	640.0	20%	0.018	45%	928.0	16.71	2.71	0.05	34288%	0.29%
Designated Approval Authority	1440.0	30%	0.026	30%	1872.0	48.92	4.65	0.12	40216%	0.25%
Information Assurance Manager	**480.0**	**15%**	**0.082**	**45%**	**696.0**	**57.22**	**11.95**	**0.98**	**5823%**	**1.72%**
Information Assurance Officer	**160.0**	**15%**	**0.057**	**40%**	**224.0**	**50.81**	**13.40**	**3.04**	**1672%**	**5.98%**
MCEN C&A Team	160.0	15%	0.135	50%	240.0	6460.18	9.77	262.86	2458%	4.07%
Program Manager	**40.0**	**5%**	**0.030**	**15%**	**46.0**	**1.38**	**10.38**	**0.31**	**443%**	**22.57%**
User Representative	**8.0**	**0%**	**0.014**	**15%**	**9.2**	**0.13**	**8.17**	**0.12**	**113%**	**88.76%**
Sum (ROK & ROI are averages)	**2928.0**	**100%**			**4015.2**	**6635.35**		**267.48**	**12145%**	**18%**
Correlation	89%				90%		**TSO-KC Values:**		**2013%**	**30%**

Table 16. “To-Be” Process Model KVA Analysis (Ver. B)

C. OBSERVATIONS AND LIMITATIONS OF SIMULATION ANALYSIS

1. Comparative Analysis of all Process Models

Based on data produced by the Savvion Process Modeler, each model displays both strong and weak attributes. Throughout this chapter, these metrics are listed

sequentially for each process model. Comparative analysis of the same metrics across 100 iterations allows for better comprehension of each model's individual traits and characteristics.

Table 17 builds on Table 13's general comparison of the "As-Is" and "To-Be" process models in Chapter III by adding the analysis of results examined in this chapter. All data is based on 100 iterations. All time units are expressed in hours, and cost figures are taken from values listed in the United States Office of Personnel Management January 2009 annual salary table.

	Process Models (100 Iterations)		
	"As-Is"	"To-Be" (Version A)	"To-Be" (Version B)
Total # of TSO-KC Actors:	10 (2 primary; 8 collateral)	9 (all primary)	7 (all primary)
Total # of TSO-KC Activities:	67 of 130 (51.54%)	116 of 144 (80.56%)	77 of 144 (53.47%)
Total # of TSO-KC Decisions:	10 of 25 (40.00%)	23 of 28 (82.14%)	13 of 28 (46.43%)
Additional Annual Cost (Estimate):	$0 (Baseline Model)	$329,680.00	$225,202.00
Average Utility Rate per Actor:	40.57%	38.14%	40.04%
Process Cost (2009 dollars):	$2,729,118.12	$2,683,126.38	$1,977,773.03
Process Duration:	48,845 hours	37,622.5 hours	35,092.5 hours
Average Process Duration per Iteration:	488.45 hours	376.23 hours	350.93 hours
Average Wait Time per Iteration:	194.37 hours	108.4 hours	95.96 hours
Average Waiting Rate per Iteration:	39.79%	28.81%	27.34%
Congestion Points in TSO-KC	40	94	53
Return on Knowledge (TSO-KC)	1349%	4348%	2013%
Cost to Benefit Ratio (TSO-KC)	95%	21%	30%

Table 17. Comparative Analysis of Model Metrics across 100 Iterations

2. Limitations of Analysis

Although two different desired models are created to explore the effects of BPR initiatives and compare those to that of the current model, limitations exist. Table 17

presents a side by side comparison of several important metrics in the process models, revealing strengths and weaknesses of each. Observed individually, each of the analyzed metrics is somewhat irrelevant, or perhaps even misleading.

For example, determining the true cost of the IA C&A process is more convoluted than simply recording the analysis of the model results. Metrics involving cost, such as process cost per 100 iterations, additional annual implementation cost, years required to perform all 100 iterations, and average process time and average waiting time per iteration must be weighed and considered accordingly.

The process model simulations are just that, simulations of the entire process. The models must be compared holistically in order to draw accurate inferences and provide solid recommendations. The observations inferred from the data output of these models are accurate estimations of the effects the TSO-KC may anticipate in the IA C&A process should these BPR initiatives be adopted.

Factors such as dissimilarities between actors, DIACAP packages, and timeline criticalities make every instance of the IA C&A process unique. Moreover, the TSO-KC is susceptible to external vicissitudes imposed by Headquarters, Marine Corps, future DoD policy, and political climate. The Savvion Process Modeler provides mechanisms to account for these conditions, but anticipating every nuance in such a complex process is impossible.

The conclusions presented in this thesis are not constrained by the specific BPR initiatives introduced in the desired “To-Be” process models. The BPR techniques applied to the desired models are not representative of the full range of possibilities available to the TSO-KC. Furthermore, minor modifications to either of the desired models could have dramatic effects on the outcome of the simulations. Recommendations for applying additional BPR techniques to the IA C&A process at the TSO-KC are explored in Chapter V.

After the initial development of the process models, each model originally executed through the Savvion Process Modeler for 10 iterations. The simulation length of

10 iterations represents duration of approximately 2.5 years in real time. As previously indicated and reiterated throughout this chapter, 100 process model iterations of the TSO-KC DIACAP equate to roughly 20 years in real time.

While 2.5 years may be more realistic than 20 years for the expected life span of an IT-related process, 10 iterations does not provide enough data on which to base plausible observations. 100 iterations of the IA C&A process through the modeling software are necessary to achieve a consistent state in the process flow and instill confidence in the accuracy of simulation results. Accordingly, the conclusions and recommendations in Chapter V of this thesis are extrapolated from process model simulations running for 100 iterations.

V. CONCLUSIONS AND RECOMMENDATIONS

A. FEASIBILITY AND SUSTAINABILITY OF EACH MODEL

As noted in Chapter IV, the conclusions in this thesis are shaped by, but not restricted to, the BPR initiatives embedded in the desired "To-Be" process models. Prior to making any credible recommendations concerning the TSO-KC IA C&A process, a feasibility and sustainability study determines whether that recommendation is plausible.

1. Current "As-Is" Model

By default, the current "As-Is" process model is feasible. The process is currently implemented at the TSO-KC and requires no additional action for process execution. This thesis, though, determines value in part from Knowledge Value Added to the process. From observation and extrapolation of the data in the model simulation, the current model contains gaps which prevent it from operating efficiently.

The Return on Knowledge in the "As-Is" model, as compared to the "To-Be" models, demonstrates that it is not sustainable as currently constructed. ROK is poor because this model suffers from a lack of formal training among TSO-KC organic actors and a failure to capitalize on process automation opportunities. While the personnel involved with the IA C&A process continue to produce acceptable results and make mission, external factors mandate that the process must change. Implementation of the Xacta IA Manager is now directed by Headquarters, Marine Corps (MarAdmin 663/08). Even so, as the incorporation of IT enables faster decision making and compresses time, continuing to track and communicate IA controls and documentation via spreadsheets and email becomes less and less practical.

2. Desired "To-Be" Model (Ver. A)

Version A of the desired model is the more radical of the "To-Be" designs, and also has the most surprising results. Version A internalizes the majority of activities and decision points in the IA C&A process. The anticipation of this model is that while the

additional responsibilities incur extra cost, greater quality control and speed are appreciated as well. Observation of the data reveals that these results are not the case. Version A of the desired model is neither feasible, nor sustainable.

As this version of the desired model introduces numerous changes to the process, it is the most disruptive to the current process flow. Approving funding for the additional billets is time consuming and requires budget execution realignment as well as restructuring the Table of Organization (T/O) for the entire TSO-KC. The IA C&A process is personality driven and the additional billets may alter the political climate at the TSO-KC. Attempting to create buy-in or ignoring concerns from current employees at the TSO-KC may defeat the purposes of BPR.

Employing a CA Representative and Validator at the TSO-KC does decrease the “Black Hole” effect discussed in Chapters II and III by increasing speed in the process, but at a disproportionate increase in internal cost. Simultaneously, this model makes poor use of the additional actors. While contributing a large amount of tacit knowledge to the process, the CA Representative, a billet normally reserved for an Echelon II Major Subordinate Command, is idle nearly 80 percent of the process time. The additional billets yields the strongest ROK of all the models, but the TSO-KC does not produce enough DIACAP packages to benefit from the inclusion of these actors. As the process continues with this scenario, the low Cost to Benefit ratio will be exponentially degrading to the effectiveness of the TSO-KC.

3. Desired “To-Be” Model (Ver. B)

The ideal outcome of this thesis is to produce a process model that allows the TSO-KC to maintain quality assurance while emphasizing timely completion and cost minimization. These issues are the primary metrics on which to base final recommendations, and a complimentary negotiation between these metrics is the only manner in which to assure the goal of this thesis is realized.

To clarify, the “As-Is” model shows the greatest utility rates for internal TSO-KC actors and the highest ROI of all the models tested, but also surrenders the lowest ROK and highest process cost and duration. Similarly, the radical version A of the “To-Be”

model generates the highest ROK at the expense of the lowest utilization rate and ROI of all the models. Although originally unintended, version B of the desired model represents somewhat of a combination between the other two models.

Because the model introduces only one additional actor (the User Representative) to the process, it's more feasible than the version A model. Additionally, this desired model creates four primary billets for the Information Assurance Officer, freeing the TSO-KC Divisions from surrendering personnel for collateral duty. Mitigating the budgetary and T/O adjustment difficulties associated with these additional billets is addressed later in this chapter.

Incorporating the supplementary training outlined in this desired model complements the inclusion of the Xacta IA Manager and benefits the IA C&A process design. Formal training for the IAOs is a one-time effort that is reinforced during the performance of their duties in the process. The supplementary training the Program Managers receive does not halt or otherwise adversely affect the actual C&A process.

While maintaining the same consistent quality in DIACAP package decisions, iterations for version B of the desired model require an average of nearly three and a half work weeks and $7,500 less to complete over the current model. The "To-Be" version B model is the most sustainable through remarkable time and cost reduction, and increased Return on Knowledge over the "As-Is" model.

B. RECOMMENDATION OF BPR INITIATIVES TO THE TSO-KC

1. Incorporation of the Desired Model into the TSO-KC Process

After analyzing the simulation metrics, the model that reliably achieves the most preferred results of Business Process Reengineering is the less radical version B of the desired process model. The conclusion of this thesis proposes the following to the TSO-KC for consideration:

- Include the Information Assurance Manager as a sitting member of all Configuration Control Boards (CCBs). Because no Information Assurance representative is typically present during any pre-CCB or CCB processes, IA personnel often resort to working reactively after decisions are completed rather than proactively when decisions are conceived. During

the CCB, the functional manger provides the requirements and outlines the guidelines for the system. Furnished with these approximate details, the IAM and IAO can begin generating the System Identification Profile and DIACAP Implementation Plan proactively, thus increasing operational tempo of the IA C&A process.

- Adopt the Xacta IA Manager software into the IA C&A process. Not only is this solution mandated by Headquarters, Marine Corps, but is also largely responsible for the decrease in process duration time. Xacta automates IA control selection, implementation, and tracking throughout the C&A process. Decision points, designed for redundant quality control against human error, have greater success rates and therefore save additional time in the process.

- Incorporate 160 hours of formalized training for every IAO and 40 hours of supplemental training for every PM. Not only does the additional training provide consistency in DIACAP package submission, it also shortens activity duration and work time as no impromptu learning is required in the execution of specific duties. Moreover, instruction on the Xacta IA Manager is easily augmented into this training.

- Bring the PM into the process full time. All three models integrate the PM into the IA C&A process, but the current "As-Is" model does not make full use of this inclusion. As stated in Chapter I, the TSO-KC is a unique organization in the Marine Corps in that it designs and maintains IT systems for other Marine Corps components. While the PM is intimately involved in the creation of the actual IT site or system, little effort is given to its corresponding IA C&A process. As a result, the IAM and IAO perform duties to compensate for the PM. Without the full inclusion of this billet, task completion time increases due to less expert input in decision making processes.

- Bring the User Representative into the process. While the PM, IAM, and IAO can ensure that a system meets Information Assurance Certification and Accreditation requirements, the security of a system is irrelevant if the system is unusable. While the User Rep plays a minor role in the overall IA C&A process, it's a critical one, nonetheless.

- Convert the Information Assurance Officer billet from eight collateral duties to four primary duties managed by the Information Assurance Manager. Regardless of process model or DIACAP activity, the IAO plays an important role in the IA C&A process. The current collateral arrangement of pulling individuals from one of the TSO-KC's eight Divisions without any prerequisite qualifications places an unnecessary risk on successful DIACAP completion. Structuring the IAO billet under the purview of the IAM ensures consistency and priority throughout the IA C&A process while allowing the TSO-KC Divisions to concentrate on creating the actual IT system.

2. Modifications to Process Model Recommendations

Although version B of the desired "To-Be" process model holds the greatest potential for successfully implementing aspects of BPR, it is not perfect. From the data collected and analyzed during the Savvion Process Modeler simulations, in fact, no one complete model can be recommended to the TSO-KC for implementation. Nevertheless, the TSO-KC retains several options to reengineer their IA C&A Process. To realize the greatest potential for positive results, a modified "To-Be" version B model is recommended for the IA C&A process. Modifications to the recommendation include the following:

- Transfer the PM to the TSO-KC under Temporary Additional Duty (TAD) orders during the entirety of the first three DIACAP activities. As stated in Chapter I, the TSO-KC is unique in that, as an organization, it creates and maintains IT sites and systems for other owning components of the Marine Corps. Prior to the development of an IS, the PM and TSO-KC agree on a proposed system's price during a Configuration Control Board, and the corresponding TSO-KC division begins system design. As the PM must remain intimately involved with system design and build, the cost of this actor is typically included as TAD costs in the overall development cost that the TSO-KC quotes for the system. Because the TSO-KC already incorporates the PM's TAD costs for new systems, this price could also be transferred to the owning agency for other scenarios in which the DIACAP will be initiated (major modification, annual review, or three year recertification). The TSO-KC should maintain Operational Control (OPCON) and Administrative Control (ADCON) over the PM during the system's IA C&A initial development, annual review, and reaccreditation.
- Transfer the User Rep into the TSO-KC under TAD orders from his or her parent command at specific points in the IA C&A process. Not directly concerned with IA, the User Rep ensures that the security instilled in a system does not negate the ability to operate it. The User Rep is idle nearly ninety percent of the process time in the version B "To-Be" model, but remains a vital component of the process regardless. Bringing the User Rep into the process on an as-needed, TAD basis from the system owning component saves the TSO-KC from additional annual salary cost, fund realignment, and T/O restructuring. The TSO-KC should maintain Operational Control (OPCON) and Administrative Control (ADCON) over the User Rep during key points in the system's IA C&A initial development, annual review, and reaccreditation.

- Hire a single actor for the Information Assurance Officer primary billet. Version B of the “To-Be” process model formats the IAO billet as a primary duty involving four actors. Although the number of IAO actors in this model halves that of the “As-Is” model, the average utilization rate per IAO in the desired version B model is only 19 percent. If only one IAO billet exists, the actor would be utilized for 76 percent of the process time, remaining idle for 24 percent of the process duration. As observed in the model results a single actor, vice four personnel, is adequate for this position.

C. RECOMMENDATIONS FOR FURTHER STUDY

The applications of BPR initiatives presented in this thesis are based on specific input from the TSO-KC Deputy Director (the process owner) to produce a change in process flow. To that end, this thesis focuses on aspects of the IA C&A process as it applies to the TSO-KC; additional areas of study regarding this specific thesis, the TSO-KC, and the IA C&A process are available and relevant.

Modifications to the process model recommendations discussed in section B of this chapter are inferences based on the observed analysis of the process model simulations. These modifications have not been simulated in the Savvion Process Modeler. Thorough analysis of these modifications may be necessary in order to develop enough confidence in them to adopt into the TSO-KC IA C&A process.

Various facets of adjacent, complimentary, and competing TSO-KC processes are not fully examined. For instance, the average wait time in the “As-Is” model is a possibly misleading metric, especially for the collateral billet of the IAO, because the process model—as well as this thesis—fail to account for other activities that personnel perform outside of the IA C&A process. Additional research of the TSO-KC as an organization could refine the analytical results produced in this thesis.

Several obstacles may prevent the BPR initiatives in this thesis from effecting positive change in the IA C&A process. This thesis, while focusing on the actual process (i.e., the “what”) in order to direct change, does not fully explore the manner (the “how”) of implementing these initiatives. Among these are internal influences such as support of TSO-KC leadership, concerns of personnel, and natural resistance to change, as well as

external factors such as the current Base Realignment and Closure (BRAC) schedule which will relocate the Technology Services Organization from Kansas City, Missouri to Indianapolis, Indiana in 2011. Follow-on study further analyzing the TSO-KC political climate and concentrating on how to implement recommended solutions would augment this thesis well.

The Department of Defense Information Assurance Certification and Accreditation Process is a dynamic solution to an evolving problem. The TSO-KC represents just one Marine Corps organization involved with this process. Across the Marine Corps, DoD services, and other Federal components, Information Assurance is an exponentially diverging area of study. To maintain situational awareness and control over the increasing threats and vulnerabilities inherent in Information Technology, research in this area of study will need to be equally dynamic and evolving.

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APPENDIX A: "AS-IS" SAVVION PROCESS MODELER OUTPUT

Simulation Results for TSOKC_DIACAP_AsIs_Final - (100 Packages)					
Duration	48845:00:00 Time			Duration hours:	48845.0
Process Time And Cost					
Process	Scenario	Instance	Total Cost ($)	Waiting Time (Time)	Total Time (Time)
TSOKC_DIACAP_AsIs_Final	(100 Packages)	100	2,729,118.12	2348364:30:00	2468746:30:00
		Grand Total	**2729118.12**	**2348364:30:00**	**2468746:30:00**

TSOKC_DIACAP_AsIs_Final	
Scenario	(100 Packages)
Instances	100

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
Analyst Assesses Risk	Any member of MCEN C&A Team	116	0:00:00	1873:00:00	1873:00:00	1873.0	0.0619	16.15
Analyst Drafts Decision	Any member of MCEN C&A Team	110	0:00:00	896:30:00	896:30:00	896.5	0.1227	8.15
Analyst Forwards Package	Any member of MCEN C&A Team	110	0:00:00	223:00:00	223:00:00	223.0	0.4933	2.03
Analyst Reviews Package	Any member of MCEN C&A Team	116	0:00:00	967:00:00	967:00:00	967.0	0.1200	8.34
CA Acknoledges Receipt of SIP	CA	100	**6:30:00**	104:00:00	110:30:00	104.0	0.9615	1.04
CA Acknowledges Validation	CA	102	**7:30:00**	105:30:00	113:00:00	105.5	0.9668	1.03
CA Documents Discrepancies	CA	6	0:00:00	50:30:00	50:30:00	50.5	0.1188	8.42
CA Files Preliminary SIP	CA	100	**14:30:00**	104:00:00	118:30:00	104.0	0.9615	1.04
CA Forwards Package	CA	104	**22:30:00**	210:30:00	233:00:00	210.5	0.4941	2.02
CA Returns Package to Analyst	CA	6	**20:00:00**	12:30:00	32:30:00	12.5	0.4800	2.08
CA Reviews SIP and DIP	CA	110	**25:00:00**	926:00:00	951:00:00	926.0	0.1188	8.42
CA Submits DIP to DAA	CA	104	**46:30:00**	210:30:00	257:00:00	210.5	0.4941	2.02
CA Tasks Validator	CA	102	**14:00:00**	105:30:00	119:30:00	105.5	0.9668	1.03
CAR Acknoledges Receipt	Any member of MCEN C&A Team	119	0:00:00	121:30:00	121:30:00	121.5	0.9794	1.02
CAR Acknoledges Receipt of SIP	Any member of MCEN C&A Team	100	0:00:00	104:00:00	104:00:00	104.0	0.9615	1.04
CAR Acknowledges Receipt	Any member of MCEN C&A Team	101	0:00:00	105:00:00	105:00:00	105.0	0.9619	1.04
CAR Analyzes Package	Any member of MCEN C&A Team	101	0:00:00	857:30:00	857:30:00	857.5	0.1178	8.49
CAR Analyzes Severity Codes	Any member of MCEN C&A Team	90	0:00:00	782:00:00	782:00:00	782.0	0.1151	8.69
CAR Determines COA	Any member of MCEN C&A Team	5	0:00:00	129:00:00	129:00:00	129.0	0.0388	25.80
CAR Determines Certification	Any member of MCEN C&A Team	106	0:00:00	1735:00:00	1735:00:00	1735.0	0.0611	16.37

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
CAR Documents Corrective Action	Any member of MCEN C&A Team	1	0:00:00	9:30:00	9:30:00	9.5	0.1053	9.50
CAR Documents Results	Any member of MCEN C&A Team	101	0:00:00	614:00:00	614:00:00	614.0	0.1645	6.08
CAR Makes Accreditation Rec	Any member of MCEN C&A Team	106	0:00:00	448:30:00	448:30:00	448.5	0.2363	4.23
CAR Modifies Severity Codes	Any member of MCEN C&A Team	5	0:00:00	64:00:00	64:00:00	64.0	0.0781	12.80
CAR Notifies CA	Any member of MCEN C&A Team	102	0:00:00	105:30:00	105:30:00	105.5	0.9668	1.03
CAR Prioritizes Package	Any member of MCEN C&A Team	101	0:00:00	827:00:00	827:00:00	827.0	0.1221	8.19
CAR Returns Package to IAM	Any member of MCEN C&A Team	1	0:00:00	2:30:00	2:30:00	2.5	0.4000	2.50
CAR Reviews Preliminary SIP	Any member of MCEN C&A Team	100	0:00:00	849:30:00	849:30:00	849.5	0.1177	8.50
CAR Reviews SIP and DIP	Any member of MCEN C&A Team	119	0:00:00	1925:30:00	1925:30:00	1925.5	0.0618	16.18
CAR Submits SIP and DIP	Any member of MCEN C&A Team	107	0:00:00	111:30:00	111:30:00	111.5	0.9596	1.04
DAA Acknoledges Receipt of DIP	DAA	104	**78:30:00**	108:00:00	186:30:00	108.0	0.9630	1.04
DAA Acknoledges Receipt of SIP	DAA	100	0:00:00	104:00:00	104:00:00	104.0	0.9615	1.04
DAA Files Preliminary SIP	DAA	100	**2:30:00**	104:00:00	106:30:00	104.0	0.9615	1.04
DAA Grants Accreditation	DAA	100	**65:30:00**	203:00:00	268:30:00	203.0	0.4926	2.03
DAA Notifies PM	DAA	100	**103:00:00**	203:00:00	306:00:00	203.0	0.4926	2.03
DAA Returns Approved DIP to PM	DAA	101	**78:00:00**	205:00:00	283:00:00	205.0	0.4927	2.03
DAA Returns to Analyst	DAA	4	0:00:00	9:30:00	9:30:00	9.5	0.4211	2.38
DAA Reviews CA Comments	DAA	104	**18:00:00**	878:00:00	896:00:00	878.0	0.1185	8.44
DAA Reviews Package	DAA	104	**53:30:00**	1680:00:00	1733:30:00	1680.0	0.0619	16.15
DAA Reviews Preliminary SIP	DAA	100	**9:00:00**	849:30:00	858:30:00	849.5	0.1177	8.50
IAM Compiles CA Package	IAM	107	**67505:00:00**	2641:00:00	70146:00:00	2641.0	0.0405	24.68
IAM Compiles SIP and DIP	IAM	119	**91876:30:00**	1914:30:00	93791:00:00	1914.5	0.0622	16.09
IAM Confirms System is IAW DIP	IAM	102	**72353:30:00**	824:00:00	73177:30:00	824.0	0.1238	8.08
IAM Corrects DIP	IAM	18	**13149:00:00**	438:30:00	13587:30:00	438.5	0.0410	24.36
IAM Creates Preliminary Plan	IAM	133	**101242:00:00**	5393:00:00	106635:00:00	5393.0	0.0247	40.55
IAM Creates Preliminary SIP	IAM	100	**64680:30:00**	6039:00:00	70719:30:00	6039.0	0.0166	60.39
IAM Determines COA	IAM	6	**3698:00:00**	204:00:00	3902:00:00	204.0	0.0294	34.00
IAM Determines COA1	IAM	5	**2981:00:00**	177:30:00	3158:30:00	177.5	0.0282	35.50
IAM Determines Inheritance	IAM	133	**103144:00:00**	1084:00:00	104228:00:00	1084.0	0.1227	8.15
IAM Determines MAC and CL	IAM	133	**101464:30:00**	270:00:00	101734:30:00	270.0	0.4926	2.03
IAM Develops POAM	IAM	96	**62136:30:00**	2351:00:00	64487:30:00	2351.0	0.0408	24.49
IAM Develops Requirements	IAM	133	**99404:00:00**	5393:00:00	104797:00:00	5393.0	0.0247	40.55
IAM Executes the DIP	IAM	102	**76511:00:00**	835:00:00	77346:00:00	835.0	0.1222	8.19

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
IAM Finalizes IA Controls	IAM	133	**102472:00:00**	818:00:00	103290:00:00	818.0	0.1626	6.15
IAM Fixes Problems in Plan	IAM	13	**9086:00:00**	156:30:00	9242:30:00	156.5	0.0831	12.04
IAM Identifies NonApplicable	IAM	133	**103575:00:00**	2167:30:00	105742:30:00	2167.5	0.0614	16.30
IAM Identifies the IS	IAM	100	**71039:00:00**	203:00:00	71242:00:00	203.0	0.4926	2.03
IAM Initiates Corrective Action	IAM	1	**401:30:00**	9:30:00	411:00:00	9.5	0.1053	9.50
IAM Initiates DIP	IAM	133	**101928:30:00**	1084:00:00	103012:30:00	1084.0	0.1227	8.15
IAM Lists Requirements	IAM	33	**25876:00:00**	70:00:00	25946:00:00	70.0	0.4714	2.12
IAM Monitors IA Control	IAM	120	**86758:00:00**	4583:30:00	91341:30:00	4583.5	0.0262	38.20
IAM Performs Final Review	IAM	107	**67264:30:00**	1324:00:00	68588:30:00	1324.0	0.0808	12.37
IAM Registers IS with DON IA	IAM	100	**69411:00:00**	408:00:00	69819:00:00	408.0	0.2451	4.08
IAM Reviews Discrepancies	IAM	18	**12809:00:00**	150:30:00	12959:30:00	150.5	0.1196	8.36
IAM Reviews IA Baseline Controls	IAM	166	**127722:00:00**	2738:00:00	130460:00:00	2738.0	0.0606	16.49
IAM Reviews IA Control Plan	IAM	102	**76622:30:00**	835:00:00	77457:30:00	835.0	0.1222	8.19
IAM Reviews Validation Report	IAM	101	**67218:30:00**	827:00:00	68045:30:00	827.0	0.1221	8.19
IAM Reviews the DIP	IAM	148	**114541:00:00**	1195:00:00	115736:00:00	1195.0	0.1238	8.07
IAM Submits Package	IAM	101	**60990:00:00**	205:00:00	61195:00:00	205.0	0.4927	2.03
IAM Submits Package1	IAM	102	**71120:00:00**	207:00:00	71327:00:00	207.0	0.4928	2.03
IAM Submits Preliminary SIP	IAM	100	**68199:00:00**	203:00:00	68402:00:00	203.0	0.4926	2.03
IAM Submits SIP and DIP to CAR	IAM	119	**90503:30:00**	239:30:00	90743:00:00	239.5	0.4969	2.01
IAM Tests IA Control	IAM	120	**85931:00:00**	2903:30:00	88834:30:00	2903.5	0.0413	24.20
IAO Applies Immediate Fixes	Any member of IAO	12	0:00:00	198:00:00	198:00:00	198.0	0.0606	16.50
IAO Assembles DIP Components	Any member of IAO	148	0:00:00	2444:00:00	2444:00:00	2444.0	0.0606	16.51
IAO Assigns Additional Controls	Any member of IAO	33	0:00:00	570:00:00	570:00:00	570.0	0.0579	17.27
IAO Assigns IA Baseline Controls	Any member of IAO	133	0:00:00	4329:00:00	4329:00:00	4329.0	0.0307	32.55
IAO Builds IA Controls into IS	Any member of IAO	120	0:00:00	2912:00:00	2912:00:00	2912.0	0.0412	24.27
IAO Completes POAM	Any member of IAO	96	0:00:00	598:30:00	598:30:00	598.5	0.1604	6.23
IAO Corrects DIP	Any member of IAO	18	0:00:00	461:00:00	461:00:00	461.0	0.0390	25.61
IAO Creates IA Control List	Any member of IAO	133	0:00:00	2167:30:00	2167:30:00	2167.5	0.0614	16.30
IAO Creates Preliminary Plan	Any member of IAO	133	0:00:00	5635:30:00	5635:30:00	5635.5	0.0236	42.37
IAO Creates Preliminary SIP	Any member of IAO	100	0:00:00	6218:00:00	6218:00:00	6218.0	0.0161	62.18
IAO Determines Actions Needed	Any member of IAO	96	0:00:00	1183:30:00	1183:30:00	1183.5	0.0811	12.33
IAO Determines COA	Any member of IAO	6	0:00:00	204:00:00	204:00:00	204.0	0.0294	34.00
IAO Determines COA1	Any member of IAO	5	0:00:00	177:30:00	177:30:00	177.5	0.0282	35.50
IAO Determines Fixes	Any member of IAO	114	0:00:00	1871:30:00	1871:30:00	1871.5	0.0609	16.42
IAO Develops POAM	Any member of IAO	96	0:00:00	2392:30:00	2392:30:00	2392.5	0.0401	24.92
IAO Develops Requirements	Any member of IAO	133	0:00:00	8735:00:00	8735:00:00	8735.0	0.0152	65.68

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
IAO Documents Implementation	Any member of IAO	120	0:00:00	1943:30:00	1943:30:00	1943.5	0.0617	16.20
IAO Documents Inheritance	Any member of IAO	133	0:00:00	1084:00:00	1084:00:00	1084.0	0.1227	8.15
IAO Documents NonApplicable	Any member of IAO	133	0:00:00	1635:30:00	1635:30:00	1635.5	0.0813	12.30
IAO Fixes Discrepancies	Any member of IAO	18	0:00:00	382:30:00	382:30:00	382.5	0.0471	21.25
IAO Fixes Problems in Plan	Any member of IAO	13	0:00:00	159:00:00	159:00:00	159.0	0.0818	12.23
IAO Incorporates IA Control Plan	Any member of IAO	120	0:00:00	2912:00:00	2912:00:00	2912.0	0.0412	24.27
IAO Performs Final Review	Any member of IAO	107	0:00:00	1324:00:00	1324:00:00	1324.0	0.0808	12.37
IAO Reviews Documents	Any member of IAO	102	0:00:00	631:00:00	631:00:00	631.0	0.1616	6.19
IAO Reviews Validation Report	Any member of IAO	101	0:00:00	827:00:00	827:00:00	827.0	0.1221	8.19
IAO Updates Artifacts	Any member of IAO	16	0:00:00	202:30:00	202:30:00	202.5	0.0790	12.66
IAO Updates IA Control Plan	Any member of IAO	18	0:00:00	227:00:00	227:00:00	227.0	0.0793	12.61
MCEN Prioritizes Package	Any member of MCEN C&A Team	106	0:00:00	867:00:00	867:00:00	867.0	0.1223	8.18
PM Acknoledges Receipt of SIP	PM	100	**13:30:00**	104:00:00	117:30:00	104.0	0.9615	1.04
PM Passes DIP to IAM	PM	102	**112:30:00**	835:00:00	947:30:00	835.0	0.1222	8.19
PM Registers IS in DITPRDON	PM	100	**88:30:00**	203:00:00	291:30:00	203.0	0.4926	2.03
PM Reviews Preliminary SIP	PM	100	**116:30:00**	849:30:00	966:00:00	849.5	0.1177	8.50
PM Reviews the SIP and DIP	PM	119	**54:30:00**	2877:30:00	2932:00:00	2877.5	0.0414	24.18
Reviewer Acknoledges Receipt	Any member of MCEN C&A Team	107	0:00:00	111:30:00	111:30:00	111.5	0.9596	1.04
Reviewer Analyzes DIP	Any member of MCEN C&A Team	107	0:00:00	4353:00:00	4353:00:00	4353.0	0.0246	40.68
Reviewer Documents Comments	Any member of MCEN C&A Team	107	0:00:00	6493:00:00	6493:00:00	6493.0	0.0165	60.68
Reviewer Submits DIP to CA	Any member of MCEN C&A Team	107	0:00:00	217:30:00	217:30:00	217.5	0.4920	2.03
Site	IAM	20	**14424:00:00**	86:30:00	14510:30:00	86.5	0.2312	4.33
System	IAM	80	**59377:00:00**	167:30:00	59544:30:00	167.5	0.4776	2.09
Val Identifies Vulnerabilities	Any member of MCEN C&A Team	114	0:00:00	462:00:00	462:00:00	462.0	0.2468	4.05
Validator Analyzes Test Results	Any member of MCEN C&A Team	114	0:00:00	955:00:00	955:00:00	955.0	0.1194	8.38
Validator Assesses Risk	Any member of MCEN C&A Team	99	0:00:00	1602:30:00	1602:30:00	1602.5	0.0618	16.19
Validator Assigns Severity Codes	Any member of MCEN C&A Team	99	0:00:00	800:00:00	800:00:00	800.0	0.1238	8.08
Validator Compiles Test Results	Any member of MCEN C&A Team	101	0:00:00	827:00:00	827:00:00	827.0	0.1221	8.19
Validator Creates Scorecard	Any member of MCEN C&A Team	101	0:00:00	412:00:00	412:00:00	412.0	0.2451	4.08
Validator Determines Fixes	Any member of MCEN C&A Team	114	0:00:00	1840:00:00	1840:00:00	1840.0	0.0620	16.14
Validator Determines POAM	Any member of MCEN C&A Team	99	0:00:00	399:00:00	399:00:00	399.0	0.2481	4.03
Validator Documents Risk Levels	Any member of MCEN C&A Team	99	0:00:00	602:00:00	602:00:00	602.0	0.1645	6.08

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
Validator Documents Test Results	Any member of MCEN C&A Team	114	0:00:00	1384:00:00	1384:00:00	1384.0	0.0824	12.14
Validator Evaluates Impact	Any member of MCEN C&A Team	94	0:00:00	773:30:00	773:30:00	773.5	0.1215	8.23
Validator Maps Vulnerabilities	Any member of MCEN C&A Team	113	0:00:00	2747:00:00	2747:00:00	2747.0	0.0411	24.31
Validator Notes Discrepancies	Any member of MCEN C&A Team	114	0:00:00	700:00:00	700:00:00	700.0	0.1629	6.14
Validator Notifies PM	Any member of MCEN C&A Team	6	0:00:00	12:30:00	12:30:00	12.5	0.4800	2.08
Validator Performs GAP Analysis	Any member of MCEN C&A Team	114	0:00:00	1840:00:00	1840:00:00	1840.0	0.0620	16.14
Validator Reviews CA Plan	Any member of MCEN C&A Team	127	0:00:00	2051:30:00	2051:30:00	2051.5	0.0619	16.15
Validator Reviews Control Plan	Any member of MCEN C&A Team	127	0:00:00	1063:30:00	1063:30:00	1063.5	0.1194	8.37
Validator Reviews Scorecard	Any member of MCEN C&A Team	101	0:00:00	412:00:00	412:00:00	412.0	0.2451	4.08
Validator Submits Report	Any member of MCEN C&A Team	101	0:00:00	205:00:00	205:00:00	205.0	0.4927	2.03
Validator Validates IA Controls	Any member of MCEN C&A Team	114	0:00:00	2769:30:00	2769:30:00	2769.5	0.0412	24.29

Resource	Unit	Cost/Unit	Threshold	Usage	Cost ($)	Times Fired (Sum)	Times Fired per Hour	AWT (Hours) (Sum)
CA	Hour	0	0	1829:00:00	0	734	0.0150	2.49183
DAA	Hour	0	0	4344:00:00	0	917	0.0188	4.73719
IAM	Hour	28.45	0	48146:00:00	1369753.7	3237	0.0663	14.8736
Any member of IAO	Hour	23.74	0	51425:30:00	1220841.37	2257	0.0462	22.7849
Any member of MCEN C&A Team	Hour	0	0	46651:00:00	0	4416	0.0904	10.5641
PM	Hour	28.45	0	4869:00:00	138523.05	521	0.0107	9.34549

Performers queue length and utilization

	Avg	Min	Max	Utilized(%)	Idle(%)
CA	0	0	1	3.74	96.26
DAA	0.01	0	2	8.89	91.11
IAM	48.06	0	83	98.57	1.43
Any member of IAO	0	0	0	13.16	86.84
Any member of MCEN C&A Team	0	0	0	0.48	99.52
PM	0.01	0	1	9.97	90.03

Bottlenecks

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_AsIs_Final	CA Acknowledges Receipt of SIP	CA	0	0	1
TSOKC_DIACAP_AsIs_Final	CA Acknowledges Validation	CA	0	0	1
TSOKC_DIACAP_AsIs_Final	CA Files Preliminary SIP	CA	0	0	1
TSOKC_DIACAP_AsIs_Final	CA Forwards Package	CA	0	0	1
TSOKC_DIACAP_AsIs_Final	CA Returns Package to Analyst	CA	0	0	1
TSOKC_DIACAP_AsIs_Final	CA Reviews SIP and DIP	CA	0	0	1

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_AsIs_Final	CA Submits DIP to DAA	CA	0	0	1
TSOKC_DIACAP_AsIs_Final	CA Tasks Validator	CA	0	0	1
TSOKC_DIACAP_AsIs_Final	DAA Acknowledges Receipt of DIP	DAA	0	0	1
TSOKC_DIACAP_AsIs_Final	DAA Files Preliminary SIP	DAA	0	0	1
TSOKC_DIACAP_AsIs_Final	DAA Grants Accreditation	DAA	0	0	1
TSOKC_DIACAP_AsIs_Final	DAA Notifies PM	DAA	0	0	1
TSOKC_DIACAP_AsIs_Final	DAA Returns Approved DIP to PM	DAA	0	0	1
TSOKC_DIACAP_AsIs_Final	DAA Reviews CA Comments	DAA	0	0	1
TSOKC_DIACAP_AsIs_Final	DAA Reviews Package	DAA	0	0	1
TSOKC_DIACAP_AsIs_Final	DAA Reviews Preliminary SIP	DAA	0	0	1
TSOKC_DIACAP_AsIs_Final	IAM Compiles CA Package	IAM	1.38	0	8
TSOKC_DIACAP_AsIs_Final	IAM Compiles SIP and DIP	IAM	1.88	0	7
TSOKC_DIACAP_AsIs_Final	IAM Confirms System is IAW DIP	IAM	1.48	0	6
TSOKC_DIACAP_AsIs_Final	IAM Corrects DIP	IAM	0.27	0	2
TSOKC_DIACAP_AsIs_Final	IAM Creates Preliminary Plan	IAM	2.07	0	8
TSOKC_DIACAP_AsIs_Final	IAM Creates Preliminary SIP	IAM	1.32	0	6
TSOKC_DIACAP_AsIs_Final	IAM Determines COA	IAM	0.08	0	1
TSOKC_DIACAP_AsIs_Final	IAM Determines COA1	IAM	0.06	0	1
TSOKC_DIACAP_AsIs_Final	IAM Determines Inheritance	IAM	2.11	0	7
TSOKC_DIACAP_AsIs_Final	IAM Determines MAC and CL	IAM	2.08	0	8
TSOKC_DIACAP_AsIs_Final	IAM Develops POAM	IAM	1.27	0	7
TSOKC_DIACAP_AsIs_Final	IAM Develops Requirements	IAM	2.04	0	7
TSOKC_DIACAP_AsIs_Final	IAM Executes the DIP	IAM	1.57	0	7
TSOKC_DIACAP_AsIs_Final	IAM Finalizes IA Controls	IAM	2.1	0	7
TSOKC_DIACAP_AsIs_Final	IAM Fixes Problems in Plan	IAM	0.19	0	1
TSOKC_DIACAP_AsIs_Final	IAM Identifies NonApplicable	IAM	2.12	0	7
TSOKC_DIACAP_AsIs_Final	IAM Identifies the IS	IAM	1.45	0	6
TSOKC_DIACAP_AsIs_Final	IAM Initiates Corrective Action	IAM	0.01	0	1
TSOKC_DIACAP_AsIs_Final	IAM Initiates DIP	IAM	2.09	0	8
TSOKC_DIACAP_AsIs_Final	IAM Lists Requirements	IAM	0.53	0	2
TSOKC_DIACAP_AsIs_Final	IAM Monitors IA Control	IAM	1.78	0	7
TSOKC_DIACAP_AsIs_Final	IAM Performs Final Review	IAM	1.38	0	8
TSOKC_DIACAP_AsIs_Final	IAM Registers IS with DON IA	IAM	1.42	0	6
TSOKC_DIACAP_AsIs_Final	IAM Reviews Discrepancies	IAM	0.26	0	1
TSOKC_DIACAP_AsIs_Final	IAM Reviews IA Baseline Controls	IAM	2.61	0	9

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_AsIs_Final	IAM Reviews IA Control Plan	IAM	1.57	0	7
TSOKC_DIACAP_AsIs_Final	IAM Reviews Validation Report	IAM	1.38	0	7
TSOKC_DIACAP_AsIs_Final	IAM Reviews the DIP	IAM	2.34	0	8
TSOKC_DIACAP_AsIs_Final	IAM Submits Package	IAM	1.25	0	7
TSOKC_DIACAP_AsIs_Final	IAM Submits Package1	IAM	1.46	0	6
TSOKC_DIACAP_AsIs_Final	IAM Submits Preliminary SIP	IAM	1.4	0	6
TSOKC_DIACAP_AsIs_Final	IAM Submits SIP and DIP to CAR	IAM	1.85	0	8
TSOKC_DIACAP_AsIs_Final	IAM Tests IA Control	IAM	1.76	0	7
TSOKC_DIACAP_AsIs_Final	PM Acknoledges Receipt of SIP	PM	0	0	1
TSOKC_DIACAP_AsIs_Final	PM Passes DIP to IAM	PM	0	0	1
TSOKC_DIACAP_AsIs_Final	PM Registers IS in DITPRDON	PM	0	0	1
TSOKC_DIACAP_AsIs_Final	PM Reviews Preliminary SIP	PM	0	0	1
TSOKC_DIACAP_AsIs_Final	PM Reviews the SIP and DIP	PM	0	0	1
TSOKC_DIACAP_AsIs_Final	Site	IAM	0.3	0	2
TSOKC_DIACAP_AsIs_Final	System	IAM	1.22	0	5
Note:	Red-marked **Waiting Time** values indicates "**Activity has waiting time**"				
	Red-marked **Usage** values indicates "**Usage crossed threshold**"				

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APPENDIX B: "TO-BE" (VER. A) SAVVION PROCESS MODELER OUTPUT

Simulation Results for TSOKC_DIACAP_ToBe_VerA_Final - (100 Packages)					
Duration	37622:30:00 Time			Duration hours:	37622.5
Process Time And Cost					
Process	**Scenario**	**Instance**	**Total Cost ($)**	**Waiting Time (Time)**	**Total Time (Time)**
TSOKC_DIACAP_ToBe_VA_Final	(100 Packages)	100	2,683,126.38	1369497:30:00	1381150:30:00
		Grand Total	**2683126.38**	**1369497:30:00**	**1381150:30:00**
TSOKC_DIACAP_ToBe_VerA_Final					
Scenario	(100 Packages)				
Instances	100				

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
Analyst Assesses Risk	Any member of MCEN C&A Team	116	0:00:00	1866:00:00	1866:00:00	1866.0	0.0622	16.09
Analyst Drafts Decision	Any member of MCEN C&A Team	110	0:00:00	890:30:00	890:30:00	890.5	0.1235	8.10
Analyst Forwards Package	Any member of MCEN C&A Team	110	0:00:00	223:00:00	223:00:00	223.0	0.4933	2.03
Analyst Reviews Package	Any member of MCEN C&A Team	116	0:00:00	978:30:00	978:30:00	978.5	0.1185	8.44
CA Acknoledges Receipt of SIP	CA	100	**10:30:00**	107:00:00	117:30:00	107.0	0.9346	1.07
CA Acknowledges Validation	CA	102	**16:00:00**	109:00:00	125:00:00	109.0	0.9358	1.07
CA Documents Discrepancies	CA	6	0:00:00	54:30:00	54:30:00	54.5	0.1101	9.08
CA Files Preliminary SIP	CA	100	**13:00:00**	107:00:00	120:00:00	107.0	0.9346	1.07
CA Forwards Package	CA	104	**9:00:00**	210:30:00	219:30:00	210.5	0.4941	2.02
CA Returns Package to Analyst	CA	6	0:00:00	13:30:00	13:30:00	13.5	0.4444	2.25
CA Reviews SIP and DIP	CA	110	**17:30:00**	940:30:00	958:00:00	940.5	0.1170	8.55
CA Submits DIP to DAA	CA	104	**49:00:00**	210:30:00	259:30:00	210.5	0.4941	2.02
CAR Acknoledges Receipt	CA Rep	113	**197:00:00**	120:00:00	317:00:00	120.0	0.9417	1.06
CAR Acknoledges Receipt of SIP	CA Rep	100	**101:30:00**	107:00:00	208:30:00	107.0	0.9346	1.07
CAR Acknowledges Receipt	CA Rep	101	**259:00:00**	108:00:00	367:00:00	108.0	0.9352	1.07
CAR Analyzes Package	CA Rep	101	**328:30:00**	865:00:00	1193:30:00	865.0	0.1168	8.56
CAR Analyzes Severity Codes	CA Rep	79	**340:30:00**	683:00:00	1023:30:00	683.0	0.1157	8.65
CAR Determines COA	CA Rep	5	0:00:00	129:00:00	129:00:00	129.0	0.0388	25.80

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
CAR Determines Certification	CA Rep	106	365:30:00	1713:00:00	2078:30:00	1713.0	0.0619	16.16
CAR Documents Corrective Action	CA Rep	1	12:30:00	6:30:00	19:00:00	6.5	0.1538	6.50
CAR Documents Results	CA Rep	101	393:00:00	607:00:00	1000:00:00	607.0	0.1664	6.01
CAR Makes Accreditation Rec	CA Rep	106	381:30:00	453:30:00	835:00:00	453.5	0.2337	4.28
CAR Modifies Severity Codes	CA Rep	4	10:30:00	52:00:00	62:30:00	52.0	0.0769	13.00
CAR Notifies CA	CA Rep	102	266:00:00	109:00:00	375:00:00	109.0	0.9358	1.07
CAR Prioritizes Package	CA Rep	101	340:30:00	432:00:00	772:30:00	432.0	0.2338	4.28
CAR Returns Package to PM	CA Rep	1	21:00:00	1:30:00	22:30:00	1.5	0.6667	1.50
CAR Reviews Preliminary SIP	CA Rep	100	152:30:00	858:30:00	1011:00:00	858.5	0.1165	8.59
CAR Reviews SIP and DIP	CA Rep	113	121:00:00	962:00:00	1083:00:00	962.0	0.1175	8.51
CAR Submits PAckage to MCEN	CA Rep	106	449:30:00	214:30:00	664:00:00	214.5	0.4942	2.02
CAR Submits SIP and DIP	CA Rep	107	193:30:00	114:30:00	308:00:00	114.5	0.9345	1.07
CAR Tasks Validator	CA Rep	102	250:00:00	109:00:00	359:00:00	109.0	0.9358	1.07
DAA Acknoledges Receipt of DIP	DAA	104	60:30:00	111:00:00	171:30:00	111.0	0.9369	1.07
DAA Acknoledges Receipt of SIP	DAA	100	29:00:00	107:00:00	136:00:00	107.0	0.9346	1.07
DAA Files Preliminary SIP	DAA	100	24:00:00	107:00:00	131:00:00	107.0	0.9346	1.07
DAA Grants Accreditation	DAA	100	123:00:00	202:30:00	325:30:00	202.5	0.4938	2.03
DAA Notifies PM	DAA	100	192:30:00	202:30:00	395:00:00	202.5	0.4938	2.03
DAA Returns Approved DIP to PM	DAA	101	69:30:00	204:00:00	273:30:00	204.0	0.4951	2.02
DAA Returns to Analyst	DAA	4	33:00:00	9:00:00	42:00:00	9.0	0.4444	2.25
DAA Reviews CA Comments	DAA	104	27:00:00	888:00:00	915:00:00	888.0	0.1171	8.54
DAA Reviews Package	DAA	104	124:30:00	1673:30:00	1798:00:00	1673.5	0.0621	16.09
DAA Reviews Preliminary SIP	DAA	100	54:30:00	858:30:00	913:00:00	858.5	0.1165	8.59
IAM Compiles CA Package	IAM	113	40944:00:00	2752:00:00	43696:00:00	2752.0	0.0411	24.35
IAM Compiles SIP and DIP	IAM	107	49331:30:00	1719:00:00	51050:30:00	1719.0	0.0622	16.07
IAM Confirms System is IAW DIP	IAM	102	44002:30:00	817:00:00	44819:30:00	817.0	0.1248	8.01
IAM Corrects DIP	IAM	12	5312:00:00	105:00:00	5417:00:00	105.0	0.1143	8.75
IAM Creates Preliminary Plan	IAM	119	52733:30:00	2864:00:00	55597:30:00	2864.0	0.0416	24.07
IAM Creates Preliminary SIP	IAM	100	42101:00:00	2420:00:00	44521:00:00	2420.0	0.0413	24.20
IAM Determines COA	IAM	4	1220:30:00	104:00:00	1324:30:00	104.0	0.0385	26.00

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
IAM Determines COA1	IAM	5	**1743:00:00**	129:00:00	1872:00:00	129.0	0.0388	25.80
IAM Determines Inheritance	IAM	119	**54483:30:00**	956:00:00	55439:30:00	956.0	0.1245	8.03
IAM Determines MAC and CL	IAM	119	**54764:00:00**	239:00:00	55003:00:00	239.0	0.4979	2.01
IAM Develops POAM	IAM	91	**32938:00:00**	1469:30:00	34407:30:00	1469.5	0.0619	16.15
IAM Develops Requirements	IAM	119	**50721:30:00**	4773:30:00	55495:00:00	4773.5	0.0249	40.11
IAM Finalizes IA Controls	IAM	119	**54209:00:00**	718:00:00	54927:00:00	718.0	0.1657	6.03
IAM Fixes Problems in Plan	IAM	6	**2497:30:00**	66:30:00	2564:00:00	66.5	0.0902	11.08
IAM Identifies NonApplicable	IAM	119	**54245:30:00**	1912:00:00	56157:30:00	1912.0	0.0622	16.07
IAM Identifies the IS	IAM	100	**44242:00:00**	107:00:00	44349:00:00	107.0	0.9346	1.07
IAM Initiates DIP	IAM	119	**54016:00:00**	956:00:00	54972:00:00	956.0	0.1245	8.03
IAM Lists Requirements	IAM	30	**13817:00:00**	63:00:00	13880:00:00	63.0	0.4762	2.10
IAM Monitors IA Control	IAM	114	**51076:30:00**	2758:00:00	53834:30:00	2758.0	0.0413	24.19
IAM Performs Final Review	IAM	113	**41136:00:00**	914:30:00	42050:30:00	914.5	0.1236	8.09
IAM Reviews Discrepancies	IAM	12	**4802:30:00**	105:00:00	4907:30:00	105.0	0.1143	8.75
IAM Reviews IA Baseline Controls	IAM	149	**68009:00:00**	2401:00:00	70410:00:00	2401.0	0.0621	16.11
IAM Reviews IA Control Plan	IAM	102	**46108:30:00**	823:30:00	46932:00:00	823.5	0.1239	8.07
IAM Reviews Validation Report	IAM	101	**36664:30:00**	815:30:00	37480:00:00	815.5	0.1239	8.07
IAM Reviews the DIP	IAM	133	**60268:30:00**	1068:00:00	61336:30:00	1068.0	0.1245	8.03
IAM Submits Package	IAM	110	**38031:30:00**	223:00:00	38254:30:00	223.0	0.4933	2.03
IAM Submits Package1	IAM	102	**43856:00:00**	206:00:00	44062:00:00	206.0	0.4951	2.02
IAM Submits Preliminary SIP	IAM	100	**44192:00:00**	202:30:00	44394:30:00	202.5	0.4938	2.03
IAM Submits SIP and DIP to CAR	IAM	113	**51493:00:00**	229:00:00	51722:00:00	229.0	0.4934	2.03
IAM Tests IA Control	IAM	114	**50218:00:00**	2758:00:00	52976:00:00	2758.0	0.0413	24.19
IAO Applies Immediate Fixes	Any member of IAO	12	0:00:00	201:00:00	201:00:00	201.0	0.0597	16.75
IAO Assembles DIP Components	Any member of IAO	133	0:00:00	1610:00:00	1610:00:00	1610.0	0.0826	12.11
IAO Assigns Additional Controls	Any member of IAO	30	0:00:00	251:30:00	251:30:00	251.5	0.1193	8.38
IAO Assigns IA Baseline Controls	Any member of IAO	119	**2:30:00**	2864:00:00	2866:30:00	2864.0	0.0416	24.07
IAO Builds IA Controls into IS	Any member of IAO	114	**3:30:00**	1834:30:00	1838:00:00	1834.5	0.0621	16.09
IAO Completes POAM	Any member of IAO	91	**3:00:00**	368:00:00	371:00:00	368.0	0.2473	4.04
IAO Corrects DIP	Any member of IAO	12	**0:30:00**	105:00:00	105:30:00	105.0	0.1143	8.75
IAO Creates IA Control List	Any member of IAO	119	0:00:00	950:00:00	950:00:00	950.0	0.1253	7.98
IAO Creates Preliminary SIP	Any member of IAO	100	0:00:00	2420:00:00	2420:00:00	2420.0	0.0413	24.20

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
IAO Determines Actions Needed	Any member of IAO	91	0:00:00	732:00:00	732:00:00	732.0	0.1243	8.04
IAO Determines COA	Any member of IAO	4	0:00:00	104:00:00	104:00:00	104.0	0.0385	26.00
IAO Determines COA1	Any member of IAO	5	0:00:00	129:00:00	129:00:00	129.0	0.0388	25.80
IAO Determines Fixes	Any member of IAO	114	**1:30:00**	1834:30:00	1836:00:00	1834.5	0.0621	16.09
IAO Develops POAM	Any member of IAO	91	0:00:00	1469:30:00	1469:30:00	1469.5	0.0619	16.15
IAO Develops Requirements	Any member of IAO	119	0:00:00	4773:30:00	4773:30:00	4773.5	0.0249	40.11
IAO Documents Implementation	Any member of IAO	114	0:00:00	1378:30:00	1378:30:00	1378.5	0.0827	12.09
IAO Documents Inheritance	Any member of IAO	119	**2:30:00**	477:00:00	479:30:00	477.0	0.2495	4.01
IAO Documents NonApplicable	Any member of IAO	119	0:00:00	956:00:00	956:00:00	956.0	0.1245	8.03
IAO Fixes Discrepancies	Any member of IAO	12	0:00:00	201:00:00	201:00:00	201.0	0.0597	16.75
IAO Fixes Problems in Plan	Any member of IAO	6	0:00:00	66:30:00	66:30:00	66.5	0.0902	11.08
IAO Incorporates IA Control Plan	Any member of IAO	114	0:00:00	1834:30:00	1834:30:00	1834.5	0.0621	16.09
IAO Performs Final Review	Any member of IAO	113	0:00:00	914:30:00	914:30:00	914.5	0.1236	8.09
IAO Reviews Documents	Any member of IAO	102	0:00:00	410:00:00	410:00:00	410.0	0.2488	4.02
IAO Reviews Validation Report	Any member of IAO	101	0:00:00	815:30:00	815:30:00	815.5	0.1239	8.07
IAO Updates Artifacts	Any member of IAO	11	0:00:00	96:30:00	96:30:00	96.5	0.1140	8.77
IAO Updates IA Control Plan	Any member of IAO	12	0:00:00	101:00:00	101:00:00	101.0	0.1188	8.42
MCEN Acknowledges Receipt	Any member of MCEN C&A Team	106	0:00:00	113:30:00	113:30:00	113.5	0.9339	1.07
MCEN Prioritizes Package	Any member of MCEN C&A Team	106	0:00:00	856:00:00	856:00:00	856.0	0.1238	8.08
PM Corrects DIP	PM	12	**43:00:00**	105:00:00	148:00:00	105.0	0.1143	8.75
PM Creates Preliminary Plan	PM	119	**201:00:00**	2864:00:00	3065:00:00	2864.0	0.0416	24.07
PM Creates Preliminary SIP	PM	100	**50:00:00**	2420:00:00	2470:00:00	2420.0	0.0413	24.20
PM Determines COA	PM	4	**15:30:00**	104:00:00	119:30:00	104.0	0.0385	26.00
PM Determines COA1	PM	5	0:00:00	129:00:00	129:00:00	129.0	0.0388	25.80
PM Develops POAM	PM	91	**562:00:00**	1469:30:00	2031:30:00	1469.5	0.0619	16.15
PM Executes the DIP	PM	102	**303:00:00**	823:30:00	1126:30:00	823.5	0.1239	8.07
PM Initiates Corrective Action	PM	1	**11:00:00**	6:30:00	17:30:00	6.5	0.1538	6.50
PM Registers IS in DITPRDON	PM	100	**119:00:00**	202:30:00	321:30:00	202.5	0.4938	2.03
PM Registers IS with DON IA	PM	100	**619:00:00**	202:30:00	821:30:00	202.5	0.4938	2.03
PM Reviews Package	PM	104	**315:00:00**	841:30:00	1156:30:00	841.5	0.1236	8.09
PM Reviews Validation Report	PM	101	**407:00:00**	815:30:00	1222:30:00	815.5	0.1239	8.07
PM Reviews the SIP and DIP	PM	104	**92:00:00**	888:00:00	980:00:00	888.0	0.1171	8.54

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
PM Submits Package to CAR	PM	101	**269:30:00**	204:00:00	473:30:00	204.0	0.4951	2.02
Reviewer Acknoledges Receipt	Any member of MCEN C&A Team	107	0:00:00	114:30:00	114:30:00	114.5	0.9345	1.07
Reviewer Analyzes DIP	Any member of MCEN C&A Team	107	0:00:00	4306:00:00	4306:00:00	4306.0	0.0248	40.24
Reviewer Documents Comments	Any member of MCEN C&A Team	107	0:00:00	6446:00:00	6446:00:00	6446.0	0.0166	60.24
Reviewer Submits DIP to CA	Any member of MCEN C&A Team	107	0:00:00	216:00:00	216:00:00	216.0	0.4954	2.02
Site	IAM	20	**8609:30:00**	48:00:00	8657:30:00	48.0	0.4167	2.40
System	IAM	80	**34928:00:00**	86:00:00	35014:00:00	86.0	0.9302	1.08
UR Acknoledges Receipt of SIP	User Rep	100	**85:30:00**	107:00:00	192:30:00	107.0	0.9346	1.07
UR Develops POAM	User Rep	91	**114:00:00**	1469:30:00	1583:30:00	1469.5	0.0619	16.15
UR Reviews Package	User Rep	110	**206:30:00**	890:30:00	1097:00:00	890.5	0.1235	8.10
UR Reviews Preliminary SIP	User Rep	100	**79:00:00**	858:30:00	937:30:00	858.5	0.1165	8.59
UR Reviews the SIP and DIP	User Rep	107	**30:00:00**	915:00:00	945:00:00	915.0	0.1169	8.55
Val Identifies Vulnerabilities	Validator	114	**7512:00:00**	458:00:00	7970:00:00	458.0	0.2489	4.02
Validator Analyzes Test Results	Validator	114	**7727:00:00**	965:00:00	8692:00:00	965.0	0.1181	8.46
Validator Assesses Risk	Validator	99	**6224:00:00**	1598:00:00	7822:00:00	1598.0	0.0620	16.14
Validator Assigns Severity Codes	Validator	99	**5826:00:00**	796:00:00	6622:00:00	796.0	0.1244	8.04
Validator Compiles Test Results	Validator	101	**6576:00:00**	815:30:00	7391:30:00	815.5	0.1239	8.07
Validator Creates Scorecard	Validator	101	**6818:00:00**	405:00:00	7223:00:00	405.0	0.2494	4.01
Validator Determines Fixes	Validator	114	**7534:30:00**	1834:30:00	9369:00:00	1834.5	0.0621	16.09
Validator Determines POAM	Validator	99	**5255:00:00**	399:30:00	5654:30:00	399.5	0.2478	4.04
Validator Documents Risk Levels	Validator	99	**5886:30:00**	598:00:00	6484:30:00	598.0	0.1656	6.04
Validator Documents Test Results	Validator	114	**7452:30:00**	1378:30:00	8831:00:00	1378.5	0.0827	12.09
Validator Evaluates Impact	Validator	94	**5694:30:00**	770:00:00	6464:30:00	770.0	0.1221	8.19
Validator Maps Vulnerabilities	Validator	113	**7326:30:00**	2733:30:00	10060:00:00	2733.5	0.0413	24.19
Validator Notes Discrepancies	Validator	114	**7514:30:00**	694:30:00	8209:00:00	694.5	0.1641	6.09
Validator Notifies PM	Validator	4	**278:30:00**	9:00:00	287:30:00	9.0	0.4444	2.25
Validator Performs GAP Analysis	Validator	114	**7454:00:00**	1834:30:00	9288:30:00	1834.5	0.0621	16.09
Validator Reviews CA Plan	Validator	120	**6836:00:00**	1926:00:00	8762:00:00	1926.0	0.0623	16.05

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired per Hour	AWT
Validator Reviews Control Plan	Validator	120	7143:00:00	1017:00:00	8160:00:00	1017.0	0.1180	8.48
Validator Reviews Scorecard	Validator	101	7045:00:00	405:00:00	7450:00:00	405.0	0.2494	4.01
Validator Submits Report	Validator	101	5253:00:00	204:00:00	5457:00:00	204.0	0.4951	2.02
Validator Validates IA Controls	Validator	114	6854:00:00	2758:00:00	9612:00:00	2758.0	0.0413	24.19

Resource	Unit	Cost/Unit	Threshold	Usage	Cost ($)	Times Fired (Sum)	Times Fired /Hour	AWT (Hours) (Sum)
CA	Hour	0	0	1752:30:00	0	632	0.0168	2.77294
CA Rep	Hour	28.45	0	7645:00:00	217500.25	1549	0.0412	4.93544
DAA	Hour	0	0	4363:00:00	0	917	0.0244	4.75791
IAM	Hour	28.45	0	34808:30:00	990301.83	2866	0.0762	12.1453
Any member of IAO	Hour	23.74	0	26897:30:00	638546.65	1977	0.0525	13.6052
Any member of MCEN C&A Team	Hour	0	0	16010:00:00	0	1092	0.0290	14.6612
PM	Hour	28.45	0	11075:30:00	315097.97	1044	0.0277	10.6087
User Rep	Hour	12.95	0	4240:30:00	54914.48	508	0.0135	8.34744
Validator	Hour	21.61	0	21599:30:00	466765.2	2049	0.0545	10.5415

Performers queue length and utilization

	Avg	Min	Max	Utilized(%)	Idle(%)
CA	0	0	2	4.66	95.34
CA Rep	0.11	0	6	20.32	79.68
DAA	0.02	0	3	11.6	88.4
IAM	32.77	0	68	92.52	7.48
Any member of IAO	0	0	1	17.87	82.13
Any member of MCEN C&A Team	0	0	0	0.21	99.79
PM	0.08	0	7	29.44	70.56
User Rep	0.01	0	3	11.27	88.73
Validator	3.41	0	26	57.41	42.59

Bottlenecks

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_ToBe_VA_Final	CA Acknoledges Receipt of SIP	CA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	CA Acknowledges Validation	CA	0	0	2
TSOKC_DIACAP_ToBe_VA_Final	CA Files Preliminary SIP	CA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	CA Forwards Package	CA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	CA Reviews SIP and DIP	CA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	CA Submits DIP to DAA	CA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	CAR Acknoledges Receipt	CA Rep	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	CAR Acknoledges Receipt of SIP	CA Rep	0	0	1

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_ToBe_VA_Final	CAR Acknowledges Receipt	CA Rep	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	CAR Analyzes Package	CA Rep	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	CAR Analyzes Severity Codes	CA Rep	0.01	0	1
TSOKC_DIACAP_ToBe_VA_Final	CAR Determines Certification	CA Rep	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	CAR Documents Corrective Action	CA Rep	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	CAR Documents Results	CA Rep	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	CAR Makes Accreditation Rec	CA Rep	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	CAR Modifies Severity Codes	CA Rep	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	CAR Notifies CA	CA Rep	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	CAR Prioritizes Package	CA Rep	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	CAR Returns Package to PM	CA Rep	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	CAR Reviews Preliminary SIP	CA Rep	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	CAR Reviews SIP and DIP	CA Rep	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	CAR Submits PAckage to MCEN	CA Rep	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	CAR Submits SIP and DIP	CA Rep	0.01	0	1
TSOKC_DIACAP_ToBe_VA_Final	CAR Tasks Validator	CA Rep	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	DAA Acknoledges Receipt of DIP	DAA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	DAA Acknoledges Receipt of SIP	DAA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	DAA Files Preliminary SIP	DAA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	DAA Grants Accreditation	DAA	0	0	2
TSOKC_DIACAP_ToBe_VA_Final	DAA Notifies PM	DAA	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	DAA Returns Approved DIP to PM	DAA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	DAA Returns to Analyst	DAA	0	0	1

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_ToBe_VA_Final	DAA Reviews CA Comments	DAA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	DAA Reviews Package	DAA	0	0	2
TSOKC_DIACAP_ToBe_VA_Final	DAA Reviews Preliminary SIP	DAA	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	IAM Compiles CA Package	IAM	1.09	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Compiles SIP and DIP	IAM	1.31	0	6
TSOKC_DIACAP_ToBe_VA_Final	IAM Confirms System is IAW DIP	IAM	1.17	0	6
TSOKC_DIACAP_ToBe_VA_Final	IAM Corrects DIP	IAM	0.14	0	2
TSOKC_DIACAP_ToBe_VA_Final	IAM Creates Preliminary Plan	IAM	1.4	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Creates Preliminary SIP	IAM	1.12	0	4
TSOKC_DIACAP_ToBe_VA_Final	IAM Determines COA	IAM	0.03	0	1
TSOKC_DIACAP_ToBe_VA_Final	IAM Determines COA1	IAM	0.05	0	1
TSOKC_DIACAP_ToBe_VA_Final	IAM Determines Inheritance	IAM	1.45	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Determines MAC and CL	IAM	1.46	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Develops POAM	IAM	0.88	0	4
TSOKC_DIACAP_ToBe_VA_Final	IAM Develops Requirements	IAM	1.35	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Finalizes IA Controls	IAM	1.44	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Fixes Problems in Plan	IAM	0.07	0	1
TSOKC_DIACAP_ToBe_VA_Final	IAM Identifies NonApplicable	IAM	1.44	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Identifies the IS	IAM	1.18	0	4
TSOKC_DIACAP_ToBe_VA_Final	IAM Initiates DIP	IAM	1.44	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Lists Requirements	IAM	0.37	0	2
TSOKC_DIACAP_ToBe_VA_Final	IAM Monitors IA Control	IAM	1.36	0	7
TSOKC_DIACAP_ToBe_VA_Final	IAM Performs Final Review	IAM	1.09	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Reviews Discrepancies	IAM	0.13	0	1

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_ToBe_VA_Final	IAM Reviews IA Baseline Controls	IAM	1.81	0	7
TSOKC_DIACAP_ToBe_VA_Final	IAM Reviews IA Control Plan	IAM	1.23	0	6
TSOKC_DIACAP_ToBe_VA_Final	IAM Reviews Validation Report	IAM	0.97	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Reviews the DIP	IAM	1.6	0	6
TSOKC_DIACAP_ToBe_VA_Final	IAM Submits Package	IAM	1.01	0	5
TSOKC_DIACAP_ToBe_VA_Final	IAM Submits Package1	IAM	1.17	0	6
TSOKC_DIACAP_ToBe_VA_Final	IAM Submits Preliminary SIP	IAM	1.17	0	4
TSOKC_DIACAP_ToBe_VA_Final	IAM Submits SIP and DIP to CAR	IAM	1.37	0	7
TSOKC_DIACAP_ToBe_VA_Final	IAM Tests IA Control	IAM	1.33	0	7
TSOKC_DIACAP_ToBe_VA_Final	IAO Assigns IA Baseline Controls	Any member of IAO	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	IAO Builds IA Controls into IS	Any member of IAO	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	IAO Completes POAM	Any member of IAO	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	IAO Corrects DIP	Any member of IAO	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	IAO Determines Fixes	Any member of IAO	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	IAO Documents Inheritance	Any member of IAO	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	PM Corrects DIP	PM	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	PM Creates Preliminary Plan	PM	0.01	0	1
TSOKC_DIACAP_ToBe_VA_Final	PM Creates Preliminary SIP	PM	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	PM Determines COA	PM	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	PM Develops POAM	PM	0.01	0	3
TSOKC_DIACAP_ToBe_VA_Final	PM Executes the DIP	PM	0.01	0	1
TSOKC_DIACAP_ToBe_VA_Final	PM Initiates Corrective Action	PM	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	PM Registers IS in DITPRDON	PM	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	PM Registers IS with DON IA	PM	0.02	0	1

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_ToBe_VA_Final	PM Reviews Package	PM	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	PM Reviews Validation Report	PM	0.01	0	3
TSOKC_DIACAP_ToBe_VA_Final	PM Reviews the SIP and DIP	PM	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	PM Submits Package to CAR	PM	0.01	0	2
TSOKC_DIACAP_ToBe_VA_Final	Site	IAM	0.23	0	1
TSOKC_DIACAP_ToBe_VA_Final	System	IAM	0.93	0	4
TSOKC_DIACAP_ToBe_VA_Final	UR Acknoledges Receipt of SIP	User Rep	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	UR Develops POAM	User Rep	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	UR Reviews Package	User Rep	0.01	0	3
TSOKC_DIACAP_ToBe_VA_Final	UR Reviews Preliminary SIP	User Rep	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	UR Reviews the SIP and DIP	User Rep	0	0	1
TSOKC_DIACAP_ToBe_VA_Final	Val Identifies Vulnerabilities	Validator	0.2	0	7
TSOKC_DIACAP_ToBe_VA_Final	Validator Analyzes Test Results	Validator	0.21	0	7
TSOKC_DIACAP_ToBe_VA_Final	Validator Assesses Risk	Validator	0.17	0	5
TSOKC_DIACAP_ToBe_VA_Final	Validator Assigns Severity Codes	Validator	0.15	0	5
TSOKC_DIACAP_ToBe_VA_Final	Validator Compiles Test Results	Validator	0.17	0	5
TSOKC_DIACAP_ToBe_VA_Final	Validator Creates Scorecard	Validator	0.18	0	5
TSOKC_DIACAP_ToBe_VA_Final	Validator Determines Fixes	Validator	0.2	0	7
TSOKC_DIACAP_ToBe_VA_Final	Validator Determines POAM	Validator	0.14	0	5
TSOKC_DIACAP_ToBe_VA_Final	Validator Documents Risk Levels	Validator	0.16	0	5
TSOKC_DIACAP_ToBe_VA_Final	Validator Documents Test Results	Validator	0.2	0	7
TSOKC_DIACAP_ToBe_VA_Final	Validator Evaluates Impact	Validator	0.15	0	5
TSOKC_DIACAP_ToBe_VA_Final	Validator Maps Vulnerabilities	Validator	0.19	0	6
TSOKC_DIACAP_ToBe_VA_Final	Validator Notes Discrepancies	Validator	0.2	0	7

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_ToBe_VA_Final	Validator Notifies PM	Validator	0.01	0	1
TSOKC_DIACAP_ToBe_VA_Final	Validator Performs GAP Analysis	Validator	0.2	0	7
TSOKC_DIACAP_ToBe_VA_Final	Validator Reviews CA Plan	Validator	0.18	0	7
TSOKC_DIACAP_ToBe_VA_Final	Validator Reviews Control Plan	Validator	0.19	0	7
TSOKC_DIACAP_ToBe_VA_Final	Validator Reviews Scorecard	Validator	0.19	0	5
TSOKC_DIACAP_ToBe_VA_Final	Validator Submits Report	Validator	0.14	0	5
TSOKC_DIACAP_ToBe_VA_Final	Validator Validates IA Controls	Validator	0.18	0	7
Note:	Red-marked **Waiting Time** values indicates "**Activity has waiting time**"				
	Red-marked **Usage** values indicates "**Usage crossed threshold**"				

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APPENDIX C: "TO-BE" (VER. B) SAVVION PROCESS MODELER OUTPUT

Simulation Results for TSOKC_DIACAP_ToBe_VerB_Final - (100 Packages)					
Duration	35092:30:00 Time			Duration hours:	35092.5
Process Time And Cost					
Process	**Scenario**	**Instance**	**Total Cost ($)**	**Waiting Time (Time)**	**Total Time (Time)**
TSOKC_DIACAP_ToBe_VB_Final	(100 Packages)	100	1,977,773.03	1219222:00:00	1237158:00:00
		Grand Total	**1977773.03**	**1219222:00:00**	**1237158:00:00**
TSOKC_DIACAP_ToBe_VerB_Final					
Scenario	(100 Packages)				
Instances	100				

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired/Hour	AWT
Analyst Assesses Risk	Any member of MCEN C&A Team	116	0:00:00	1846:00:00	1846:00:00	1846.0	0.0628	15.91
Analyst Drafts Decision	Any member of MCEN C&A Team	110	0:00:00	867:30:00	867:30:00	867.5	0.1268	7.89
Analyst Forwards Package	Any member of MCEN C&A Team	110	0:00:00	219:00:00	219:00:00	219.0	0.5023	1.99
Analyst Reviews Package	Any member of MCEN C&A Team	116	0:00:00	966:30:00	966:30:00	966.5	0.1200	8.33
CA Acknoledges Receipt of SIP	CA	100	**3:00:00**	104:30:00	107:30:00	104.5	0.9569	1.05
CA Acknowledges Validation	CA	102	**15:30:00**	107:30:00	123:00:00	107.5	0.9488	1.05
CA Documents Discrepancies	CA	6	0:00:00	49:00:00	49:00:00	49.0	0.1224	8.17
CA Files Preliminary SIP	CA	100	**12:00:00**	104:30:00	116:30:00	104.5	0.9569	1.05
CA Forwards Package	CA	104	**7:00:00**	206:00:00	213:00:00	206.0	0.5049	1.98
CA Returns Package to Analyst	CA	6	0:00:00	12:30:00	12:30:00	12.5	0.4800	2.08
CA Reviews SIP and DIP	CA	110	**26:00:00**	920:30:00	946:30:00	920.5	0.1195	8.37
CA Submits DIP to DAA	CA	104	**39:00:00**	206:00:00	245:00:00	206.0	0.5049	1.98
CAR Acknoledges Receipt	Any member of MCEN C&A Team	119	0:00:00	123:00:00	123:00:00	123.0	0.9675	1.03
CAR Acknoledges Receipt of SIP	Any member of MCEN C&A Team	100	0:00:00	104:30:00	104:30:00	104.5	0.9569	1.05
CAR Acknowledges Receipt	Any member of MCEN C&A Team	101	0:00:00	106:00:00	106:00:00	106.0	0.9528	1.05
CAR Analyzes Package	Any member of MCEN C&A Team	101	0:00:00	843:30:00	843:30:00	843.5	0.1197	8.35
CAR Analyzes Severity Codes	Any member of MCEN C&A Team	85	0:00:00	709:30:00	709:30:00	709.5	0.1198	8.35
CAR Determines COA	Any member of MCEN C&A Team	5	0:00:00	123:00:00	123:00:00	123.0	0.0407	24.60
CAR Determines Certification	Any member of MCEN C&A Team	106	0:00:00	1678:00:00	1678:00:00	1678.0	0.0632	15.83

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired/Hour	AWT
CAR Documents Corrective Action	Any member of MCEN C&A Team	1	0:00:00	5:00:00	5:00:00	5.0	0.2000	5.00
CAR Documents Results	Any member of MCEN C&A Team	101	0:00:00	598:30:00	598:30:00	598.5	0.1688	5.93
CAR Makes Accreditation Rec	Any member of MCEN C&A Team	106	0:00:00	441:00:00	441:00:00	441.0	0.2404	4.16
CAR Modifies Severity Codes	Any member of MCEN C&A Team	5	0:00:00	61:00:00	61:00:00	61.0	0.0820	12.20
CAR Notifies CA	Any member of MCEN C&A Team	102	0:00:00	107:30:00	107:30:00	107.5	0.9488	1.05
CAR Prioritizes Package	Any member of MCEN C&A Team	101	0:00:00	790:30:00	790:30:00	790.5	0.1278	7.83
CAR Returns Package to PM	Any member of MCEN C&A Team	1	0:00:00	1:30:00	1:30:00	1.5	0.6667	1.50
CAR Reviews Preliminary SIP	Any member of MCEN C&A Team	100	0:00:00	833:00:00	833:00:00	833.0	0.1200	8.33
CAR Reviews SIP and DIP	Any member of MCEN C&A Team	119	0:00:00	1886:00:00	1886:00:00	1886.0	0.0631	15.85
CAR Submits PAckage to MCEN	Any member of MCEN C&A Team	106	0:00:00	211:00:00	211:00:00	211.0	0.5024	1.99
CAR Submits SIP and DIP	Any member of MCEN C&A Team	107	0:00:00	112:30:00	112:30:00	112.5	0.9511	1.05
CAR Tasks Validator	Any member of MCEN C&A Team	102	0:00:00	107:30:00	107:30:00	107.5	0.9488	1.05
DAA Acknoledges Receipt of DIP	DAA	104	**87:30:00**	109:00:00	196:30:00	109.0	0.9541	1.05
DAA Acknoledges Receipt of SIP	DAA	100	**33:00:00**	104:30:00	137:30:00	104.5	0.9569	1.05
DAA Files Preliminary SIP	DAA	100	**57:00:00**	104:30:00	161:30:00	104.5	0.9569	1.05
DAA Grants Accreditation	DAA	100	**198:30:00**	198:00:00	396:30:00	198.0	0.5051	1.98
DAA Notifies PM	DAA	100	**274:00:00**	198:00:00	472:00:00	198.0	0.5051	1.98
DAA Returns Approved DIP to PM	DAA	101	**103:00:00**	199:30:00	302:30:00	199.5	0.5063	1.98
DAA Returns to Analyst	DAA	4	0:00:00	8:30:00	8:30:00	8.5	0.4706	2.13
DAA Reviews CA Comments	DAA	104	**42:30:00**	866:30:00	909:00:00	866.5	0.1200	8.33
DAA Reviews Package	DAA	104	**185:30:00**	1647:00:00	1832:30:00	1647.0	0.0631	15.84
DAA Reviews Preliminary SIP	DAA	100	**67:30:00**	833:00:00	900:30:00	833.0	0.1200	8.33
IAM Compiles CA Package	IAM	113	**43008:30:00**	2734:30:00	45743:00:00	2734.5	0.0413	24.20
IAM Compiles SIP and DIP	IAM	107	**47649:30:00**	1700:30:00	49350:00:00	1700.5	0.0629	15.89
IAM Confirms System is IAW DIP	IAM	102	**43327:00:00**	809:30:00	44136:30:00	809.5	0.1260	7.94
IAM Corrects DIP	IAM	18	**7837:00:00**	145:00:00	7982:00:00	145.0	0.1241	8.06
IAM Creates Preliminary Plan	IAM	119	**48896:30:00**	2838:00:00	51734:30:00	2838.0	0.0419	23.85
IAM Creates Preliminary SIP	IAM	100	**39494:30:00**	2377:00:00	41871:30:00	2377.0	0.0421	23.77
IAM Determines COA	IAM	4	**1486:30:00**	97:30:00	1584:00:00	97.5	0.0410	24.38
IAM Determines COA1	IAM	5	**1881:00:00**	123:00:00	2004:00:00	123.0	0.0407	24.60
IAM Determines Inheritance	IAM	119	**51880:00:00**	939:30:00	52819:30:00	939.5	0.1267	7.89
IAM Determines MAC and CL	IAM	119	**51650:00:00**	236:30:00	51886:30:00	236.5	0.5032	1.99

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired/Hour	AWT
IAM Develops POAM	IAM	91	37132:00:00	1446:00:00	38578:00:00	1446.0	0.0629	15.89
IAM Develops Requirements	IAM	119	47679:00:00	4720:00:00	52399:00:00	4720.0	0.0252	39.66
IAM Finalizes IA Controls	IAM	119	51915:00:00	716:30:00	52631:30:00	716.5	0.1661	6.02
IAM Fixes Problems in Plan	IAM	13	5494:30:00	136:00:00	5630:30:00	136.0	0.0956	10.46
IAM Identifies NonApplicable	IAM	119	51599:30:00	1886:00:00	53485:30:00	1886.0	0.0631	15.85
IAM Identifies the IS	IAM	100	41430:00:00	104:30:00	41534:30:00	104.5	0.9569	1.05
IAM Initiates DIP	IAM	119	51054:00:00	939:30:00	51993:30:00	939.5	0.1267	7.89
IAM Lists Requirements	IAM	30	13348:00:00	61:00:00	13409:00:00	61.0	0.4918	2.03
IAM Monitors IA Control	IAM	114	49563:30:00	2726:30:00	52290:00:00	2726.5	0.0418	23.92
IAM Performs Final Review	IAM	113	43723:30:00	898:30:00	44622:00:00	898.5	0.1258	7.95
IAM Reviews Discrepancies	IAM	12	4807:30:00	102:00:00	4909:30:00	102.0	0.1176	8.50
IAM Reviews IA Baseline Controls	IAM	149	64671:30:00	2386:30:00	67058:00:00	2386.5	0.0624	16.02
IAM Reviews IA Control Plan	IAM	102	44437:30:00	800:00:00	45237:30:00	800.0	0.1275	7.84
IAM Reviews Validation Report	IAM	101	42051:30:00	790:30:00	42842:00:00	790.5	0.1278	7.83
IAM Reviews the DIP	IAM	133	58383:00:00	1066:00:00	59449:00:00	1066.0	0.1248	8.02
IAM Submits Package	IAM	110	42874:30:00	219:00:00	43093:30:00	219.0	0.5023	1.99
IAM Submits Package1	IAM	102	43621:30:00	202:00:00	43823:30:00	202.0	0.5050	1.98
IAM Submits Preliminary SIP	IAM	100	41196:30:00	198:00:00	41394:30:00	198.0	0.5051	1.98
IAM Submits SIP and DIP to CAR	IAM	119	52826:00:00	236:30:00	53062:30:00	236.5	0.5032	1.99
IAM Tests IA Control	IAM	114	48959:30:00	2726:30:00	51686:00:00	2726.5	0.0418	23.92
IAO Applies Immediate Fixes	Any member of IAO	12	0:00:00	198:00:00	198:00:00	198.0	0.0606	16.50
IAO Assembles DIP Components	Any member of IAO	133	0:30:00	1596:30:00	1597:00:00	1596.5	0.0833	12.00
IAO Assigns Additional Controls	Any member of IAO	30	0:00:00	241:00:00	241:00:00	241.0	0.1245	8.03
IAO Assigns IA Baseline Controls	Any member of IAO	119	0:00:00	2838:00:00	2838:00:00	2838.0	0.0419	23.85
IAO Builds IA Controls into IS	Any member of IAO	114	2:30:00	1816:00:00	1818:30:00	1816.0	0.0628	15.93
IAO Completes POAM	Any member of IAO	91	0:00:00	360:00:00	360:00:00	360.0	0.2528	3.96
IAO Corrects DIP	Any member of IAO	18	0:00:00	145:00:00	145:00:00	145.0	0.1241	8.06
IAO Creates IA Control List	Any member of IAO	119	0:00:00	947:00:00	947:00:00	947.0	0.1257	7.96
IAO Creates Preliminary SIP	Any member of IAO	100	0:00:00	2377:00:00	2377:00:00	2377.0	0.0421	23.77
IAO Determines Actions Needed	Any member of IAO	91	0:00:00	724:00:00	724:00:00	724.0	0.1257	7.96
IAO Determines COA	Any member of IAO	4	0:00:00	97:30:00	97:30:00	97.5	0.0410	24.38
IAO Determines COA1	Any member of IAO	5	0:00:00	123:00:00	123:00:00	123.0	0.0407	24.60
IAO Determines Fixes	Any member of IAO	114	0:00:00	1816:00:00	1816:00:00	1816.0	0.0628	15.93
IAO Develops POAM	Any member of IAO	91	0:00:00	1446:00:00	1446:00:00	1446.0	0.0629	15.89
IAO Develops Requirements	Any member of IAO	119	0:00:00	4720:00:00	4720:00:00	4720.0	0.0252	39.66
IAO Documents Implementation	Any member of IAO	114	0:00:00	1360:00:00	1360:00:00	1360.0	0.0838	11.93

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired/Hour	AWT
IAO Documents Inheritance	Any member of IAO	119	0:00:00	474:30:00	474:30:00	474.5	0.2508	3.99
IAO Documents NonApplicable	Any member of IAO	119	0:00:00	939:30:00	939:30:00	939.5	0.1267	7.89
IAO Fixes Discrepancies	Any member of IAO	12	0:00:00	198:00:00	198:00:00	198.0	0.0606	16.50
IAO Fixes Problems in Plan	Any member of IAO	13	0:00:00	136:00:00	136:00:00	136.0	0.0956	10.46
IAO Incorporates IA Control Plan	Any member of IAO	114	0:00:00	1816:00:00	1816:00:00	1816.0	0.0628	15.93
IAO Performs Final Review	Any member of IAO	113	0:00:00	898:30:00	898:30:00	898.5	0.1258	7.95
IAO Reviews Documents	Any member of IAO	102	**4:30:00**	406:00:00	410:30:00	406.0	0.2512	3.98
IAO Reviews Validation Report	Any member of IAO	101	0:00:00	790:30:00	790:30:00	790.5	0.1278	7.83
IAO Updates Artifacts	Any member of IAO	11	0:00:00	94:30:00	94:30:00	94.5	0.1164	8.59
IAO Updates IA Control Plan	Any member of IAO	12	0:00:00	99:30:00	99:30:00	99.5	0.1206	8.29
MCEN Acknowledges Receipt	Any member of MCEN C&A Team	106	0:00:00	111:30:00	111:30:00	111.5	0.9507	1.05
MCEN Prioritizes Package	Any member of MCEN C&A Team	106	0:00:00	835:00:00	835:00:00	835.0	0.1269	7.88
PM Corrects DIP	PM	18	**48:00:00**	145:00:00	193:00:00	145.0	0.1241	8.06
PM Creates Preliminary Plan	PM	119	**172:30:00**	2838:00:00	3010:30:00	2838.0	0.0419	23.85
PM Creates Preliminary SIP	PM	100	**57:00:00**	2377:00:00	2434:00:00	2377.0	0.0421	23.77
PM Determines COA	PM	4	**2:00:00**	97:30:00	99:30:00	97.5	0.0410	24.38
PM Determines COA1	PM	5	**35:00:00**	123:00:00	158:00:00	123.0	0.0407	24.60
PM Develops POAM	PM	91	**249:30:00**	1446:00:00	1695:30:00	1446.0	0.0629	15.89
PM Executes the DIP	PM	102	**431:00:00**	800:00:00	1231:00:00	800.0	0.1275	7.84
PM Initiates Corrective Action	PM	1	0:00:00	5:00:00	5:00:00	5.0	0.2000	5.00
PM Registers IS in DITPRDON	PM	100	**172:00:00**	198:00:00	370:00:00	198.0	0.5051	1.98
PM Registers IS with DON IA	PM	100	**542:00:00**	198:00:00	740:00:00	198.0	0.5051	1.98
PM Reviews Package	PM	104	**227:00:00**	815:00:00	1042:00:00	815.0	0.1276	7.84
PM Reviews Validation Report	PM	101	**378:30:00**	790:30:00	1169:00:00	790.5	0.1278	7.83
PM Reviews the SIP and DIP	PM	104	**159:30:00**	866:30:00	1026:00:00	866.5	0.1200	8.33
PM Submits Package to CAR	PM	101	**284:00:00**	199:30:00	483:30:00	199.5	0.5063	1.98
Reviewer Acknoledges Receipt	Any member of MCEN C&A Team	107	0:00:00	112:30:00	112:30:00	112.5	0.9511	1.05
Reviewer Analyzes DIP	Any member of MCEN C&A Team	107	0:00:00	4245:00:00	4245:00:00	4245.0	0.0252	39.67
Reviewer Documents Comments	Any member of MCEN C&A Team	107	0:00:00	6385:00:00	6385:00:00	6385.0	0.0168	59.67
Reviewer Submits DIP to CA	Any member of MCEN C&A Team	107	0:00:00	213:30:00	213:30:00	213.5	0.5012	2.00
Site	IAM	20	**7897:30:00**	40:30:00	7938:00:00	40.5	0.4938	2.03
System	IAM	80	**32846:00:00**	82:30:00	32928:30:00	82.5	0.9697	1.03
UR Acknoledges Receipt of SIP	User Rep	100	**95:00:00**	104:30:00	199:30:00	104.5	0.9569	1.05
UR Develops POAM	User Rep	91	**71:00:00**	1446:00:00	1517:00:00	1446.0	0.0629	15.89
UR Reviews Package	User Rep	110	**326:30:00**	867:30:00	1194:00:00	867.5	0.1268	7.89

Activity	Performer	Occurs	Waiting Time (Time)	Time to Complete (Time)	Total Time (Time)	Work Time (Hours)	Fired/Hour	AWT
UR Reviews Preliminary SIP	User Rep	100	**146:00:00**	833:00:00	979:00:00	833.0	0.1200	8.33
UR Reviews the SIP and DIP	User Rep	107	**45:00:00**	897:30:00	942:30:00	897.5	0.1192	8.39
Val Identifies Vulnerabilities	Any member of MCEN C&A Team	114	0:00:00	453:00:00	453:00:00	453.0	0.2517	3.97
Validator Analyzes Test Results	Any member of MCEN C&A Team	114	0:00:00	947:30:00	947:30:00	947.5	0.1203	8.31
Validator Assesses Risk	Any member of MCEN C&A Team	99	0:00:00	1567:00:00	1567:00:00	1567.0	0.0632	15.83
Validator Assigns Severity Codes	Any member of MCEN C&A Team	99	0:00:00	784:30:00	784:30:00	784.5	0.1262	7.92
Validator Compiles Test Results	Any member of MCEN C&A Team	101	0:00:00	790:30:00	790:30:00	790.5	0.1278	7.83
Validator Creates Scorecard	Any member of MCEN C&A Team	101	0:00:00	396:30:00	396:30:00	396.5	0.2547	3.93
Validator Determines Fixes	Any member of MCEN C&A Team	114	0:00:00	1816:00:00	1816:00:00	1816.0	0.0628	15.93
Validator Determines POAM	Any member of MCEN C&A Team	99	0:00:00	393:30:00	393:30:00	393.5	0.2516	3.97
Validator Documents Risk Levels	Any member of MCEN C&A Team	99	0:00:00	586:30:00	586:30:00	586.5	0.1688	5.92
Validator Documents Test Results	Any member of MCEN C&A Team	114	0:00:00	1360:00:00	1360:00:00	1360.0	0.0838	11.93
Validator Evaluates Impact	Any member of MCEN C&A Team	94	0:00:00	742:00:00	742:00:00	742.0	0.1267	7.89
Validator Maps Vulnerabilities	Any member of MCEN C&A Team	113	0:00:00	2708:00:00	2708:00:00	2708.0	0.0417	23.96
Validator Notes Discrepancies	Any member of MCEN C&A Team	114	0:00:00	687:30:00	687:30:00	687.5	0.1658	6.03
Validator Notifies PM	Any member of MCEN C&A Team	4	0:00:00	8:30:00	8:30:00	8.5	0.4706	2.13
Validator Performs GAP Analysis	Any member of MCEN C&A Team	114	0:00:00	1816:00:00	1816:00:00	1816.0	0.0628	15.93
Validator Reviews CA Plan	Any member of MCEN C&A Team	127	0:00:00	2023:30:00	2023:30:00	2023.5	0.0628	15.93
Validator Reviews Control Plan	Any member of MCEN C&A Team	127	0:00:00	1075:30:00	1075:30:00	1075.5	0.1181	8.47
Validator Reviews Scorecard	Any member of MCEN C&A Team	101	0:00:00	396:30:00	396:30:00	396.5	0.2547	3.93
Validator Submits Report	Any member of MCEN C&A Team	101	0:00:00	199:30:00	199:30:00	199.5	0.5063	1.98
Validator Validates IA Controls	Any member of MCEN C&A Team	114	0:00:00	2726:30:00	2726:30:00	2726.5	0.0418	23.92

Resource	Unit	Cost/Unit	Threshold	Usage	Cost ($)	Times Fired (Sum)	Times Fired /Hour	AWT (Hours) (Sum)
CA	Hour	0	0	1710:30:00	0	632	0.0180	2.70649
DAA	Hour	0	0	4268:30:00	0	917	0.0261	4.65485
IAM	Hour	28.45	0	34485:30:00	981112.48	2885	0.0822	11.9534
Any member of IAO	Hour	23.74	0	26658:00:00	632860.92	1990	0.0567	13.396
Any member of MCEN C&A Team	Hour	0	0	46122:30:00	0	4723	0.1346	9.76551
PM	Hour	28.45	0	10899:00:00	310076.55	1050	0.0299	10.38
User Rep	Hour	12.95	0	4148:30:00	53723.08	508	0.0145	8.16634

Performers queue length and utilization					
	Avg	Min	Max	Utilized(%)	Idle(%)
CA	0	0	2	4.87	95.13
DAA	0.03	0	3	12.16	87.84
IAM	34.61	0	63	98.27	1.73
Any member of IAO	0	0	1	18.99	81.01
Any member of MCEN C&A Team	0	0	0	0.66	99.34
PM	0.08	0	5	31.06	68.94
User Rep	0.02	0	3	11.82	88.18

Bottlenecks					
Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_ToBe_VB_Final	CA Acknowledges Receipt of SIP	CA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	CA Acknowledges Validation	CA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	CA Files Preliminary SIP	CA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	CA Forwards Package	CA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	CA Reviews SIP and DIP	CA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	CA Submits DIP to DAA	CA	0	0	2
TSOKC_DIACAP_ToBe_VB_Final	DAA Acknowledges Receipt of DIP	DAA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	DAA Acknowledges Receipt of SIP	DAA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	DAA Files Preliminary SIP	DAA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	DAA Grants Accreditation	DAA	0.01	0	2
TSOKC_DIACAP_ToBe_VB_Final	DAA Notifies PM	DAA	0.01	0	2
TSOKC_DIACAP_ToBe_VB_Final	DAA Returns Approved DIP to PM	DAA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	DAA Reviews CA Comments	DAA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	DAA Reviews Package	DAA	0.01	0	2
TSOKC_DIACAP_ToBe_VB_Final	DAA Reviews Preliminary SIP	DAA	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	IAM Compiles CA Package	IAM	1.23	0	6
TSOKC_DIACAP_ToBe_VB_Final	IAM Compiles SIP and DIP	IAM	1.36	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Confirms System is IAW DIP	IAM	1.23	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Corrects DIP	IAM	0.22	0	2
TSOKC_DIACAP_ToBe_VB_Final	IAM Creates Preliminary Plan	IAM	1.39	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Creates Preliminary SIP	IAM	1.13	0	4
TSOKC_DIACAP_ToBe_VB_Final	IAM Determines COA	IAM	0.04	0	1
TSOKC_DIACAP_ToBe_VB_Final	IAM Determines COA1	IAM	0.05	0	1
TSOKC_DIACAP_ToBe_VB_Final	IAM Determines Inheritance	IAM	1.48	0	4
TSOKC_DIACAP_ToBe_VB_Final	IAM Determines MAC and CL	IAM	1.47	0	5

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_ToBe_VB_Final	IAM Develops POAM	IAM	1.06	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Develops Requirements	IAM	1.36	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Finalizes IA Controls	IAM	1.48	0	4
TSOKC_DIACAP_ToBe_VB_Final	IAM Fixes Problems in Plan	IAM	0.16	0	1
TSOKC_DIACAP_ToBe_VB_Final	IAM Identifies NonApplicable	IAM	1.47	0	4
TSOKC_DIACAP_ToBe_VB_Final	IAM Identifies the IS	IAM	1.18	0	4
TSOKC_DIACAP_ToBe_VB_Final	IAM Initiates DIP	IAM	1.45	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Lists Requirements	IAM	0.38	0	1
TSOKC_DIACAP_ToBe_VB_Final	IAM Monitors IA Control	IAM	1.41	0	6
TSOKC_DIACAP_ToBe_VB_Final	IAM Performs Final Review	IAM	1.25	0	6
TSOKC_DIACAP_ToBe_VB_Final	IAM Reviews Discrepancies	IAM	0.14	0	1
TSOKC_DIACAP_ToBe_VB_Final	IAM Reviews IA Baseline Controls	IAM	1.84	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Reviews IA Control Plan	IAM	1.27	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Reviews Validation Report	IAM	1.2	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Reviews the DIP	IAM	1.66	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Submits Package	IAM	1.22	0	6
TSOKC_DIACAP_ToBe_VB_Final	IAM Submits Package1	IAM	1.24	0	5
TSOKC_DIACAP_ToBe_VB_Final	IAM Submits Preliminary SIP	IAM	1.17	0	4
TSOKC_DIACAP_ToBe_VB_Final	IAM Submits SIP and DIP to CAR	IAM	1.51	0	6
TSOKC_DIACAP_ToBe_VB_Final	IAM Tests IA Control	IAM	1.4	0	6
TSOKC_DIACAP_ToBe_VB_Final	IAO Assembles DIP Components	Any member of IAO	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	IAO Builds IA Controls into IS	Any member of IAO	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	IAO Reviews Documents	Any member of IAO	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	PM Corrects DIP	PM	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	PM Creates Preliminary Plan	PM	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	PM Creates Preliminary SIP	PM	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	PM Determines COA	PM	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	PM Determines COA1	PM	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	PM Develops POAM	PM	0.01	0	1
TSOKC_DIACAP_ToBe_VB_Final	PM Executes the DIP	PM	0.01	0	2
TSOKC_DIACAP_ToBe_VB_Final	PM Registers IS in DITPRDON	PM	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	PM Registers IS with DON IA	PM	0.02	0	1

Process	Activity	Performer	Avg Queue Length	Min Queue Length	Max Queue Length
TSOKC_DIACAP_ToBe_VB_Final	PM Reviews Package	PM	0.01	0	2
TSOKC_DIACAP_ToBe_VB_Final	PM Reviews Validation Report	PM	0.01	0	2
TSOKC_DIACAP_ToBe_VB_Final	PM Reviews the SIP and DIP	PM	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	PM Submits Package to CAR	PM	0.01	0	2
TSOKC_DIACAP_ToBe_VB_Final	Site	IAM	0.23	0	1
TSOKC_DIACAP_ToBe_VB_Final	System	IAM	0.94	0	3
TSOKC_DIACAP_ToBe_VB_Final	UR Acknoledges Receipt of SIP	User Rep	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	UR Develops POAM	User Rep	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	UR Reviews Package	User Rep	0.01	0	3
TSOKC_DIACAP_ToBe_VB_Final	UR Reviews Preliminary SIP	User Rep	0	0	1
TSOKC_DIACAP_ToBe_VB_Final	UR Reviews the SIP and DIP	User Rep	0	0	1
Note:	Red-marked **Waiting Time** values indicates "**Activity has waiting time**"				
	Red-marked **Usage** values indicates **"Usage crossed threshold**"				

LIST OF REFERENCES

About NMCI |eds.com. (2009). Retrieved June 23, 2009, from Navy Marine Corps Intranet (NMCI) Web site: http://www.eds.com/sites/nmci/about/

Buckley, C. (2009, March). *DIACAP: The Defense Information Assurance Certification and Accreditation Process.* Paper presented at the United States Marine Corps Information Assurance Conference, Atlanta, GA.

Committee on National Security Systems. (2006). *National Information Assurance (IA) Glossary* (CNSSI 4009). Ft Meade: National Security Agency.

Compliance Assessment. (2009). Retrieved June 6, 2009, from Telos Corp Web site: http://www.telos.com/solutions/information%20assurance/xacta%20ia%20manager/compliance/

Department of Defense. (1997). *DoD Information Technology Security Certification and Accreditation Process (DITSCAP)* (DoDI 5200.40).

Department of Defense. (2007). *DoD Information Assurance Certification and Accreditation Process (DIACAP)* (DoDI 8510.01).

DIACAP Activities—DIACAP Knowledge Service. (n.d.). Retrieved May 18, 2009, from DIACAP Knowledge Service Web site (requires CAC PKI certification): https://diacap.iaportal.navy.mil/ks/Site%20Pages/About%20DIACAP/AD.4.0.aspx

Hammer, M., & Champy, J. (1993). *Reengineering the Corporation: A Manifesto for Business Revolution*, New York, NY: HarperCollins.

Marine Administrative Message 663/08. (2008). *MCBUL 5239. TRANSITION TO THE DOD INFORMATION ASSURANCE CERTIFICATION AND ACREDITATION PROCESS (DIACAP)* (MarAdmin 663/08). Washington, D.C.: Commandant of the Marine Corps.

Teng, J.T.C.; Grover, V.; Fiedler, K., "Business Process Reengineering: Charting a Strategic Path for the Information Age," *California Management Review*, 36, 3, 1994, pp. 9–31.

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